Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

Ag84Pro
Cop 5

ABSTRACTS of RECENT PUBLISHED MATERIAL on Soil and Water Conservation

LIBRARY
CURRENT SERIAL RECORD
DEC 21 1950
U. S. DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PA.-143

NOVEMBER 1950

ABSTRACTS OF RECENT PUBLISHED MATERIAL ON SOIL AND WATER CONSERVATION

No. IV

By: J. H. Stallings, Soil Conservationist,
Soil Conservation Service

FOREWORD

The purpose of this publication is to bring together a summary of current information about soil and water conservation for ready reference of those who are actively engaged in soil conservation work. Its distribution will be confined to technical personnel of the Soil Conservation Service and cooperating agencies and to such other scientists or conservation workers as specifically request it.

This is the fourth issue in a series of publications under this title. Other issues will be prepared and distributed at irregular intervals as new material seems to warrant them, probably about twice each year.

The active cooperation of Soil Conservation Service personnel and cooperating personnel, who publish any significant material, is needed if these publications are to adequately serve the intended purpose. Such cooperation can best be rendered by supplying this office with an abstract, reprint, or copy of the published item as soon as it is published.

SUBJECT MATTER INDEX

Page

ABSTRACTS
Abstracts of Recent Published Material on Soil and Water Conservation. 34
AGGREGATION
Aggregation of Inorganic Particles in Hesperia Sandy Loam. 50
Crushing Strength of Aggregated Soil Materials. 51
Influence of Seasonal and Cultural Conditions on Aggregation of Hagerstown Soil. 2
Mean Weight-Diameter of Soil Aggregates as a Statistical Index of Aggregation. 50
March of Water-Stable Aggregation with Relation to Initial Soil Particle Size. 66
Pore Space and Aggregation in a Chernozem Soil as Affected by Age of Perennial Grass Sod. 35
The Influence of Humus on Soil Aggregation. 28
The Influence of Earthworms on Soil Aggregation. 28
Water-Stable Aggregation in Artificially Saline and Saline-Alkali Soils. 55
ALFALFA
Alfalfa—Its Mineral Requirements and Chemical Composition. 18
Alfalfa - Its Mineral Requirements and Chemical Composition. 43
Correlation of Yield and Quality of Alfalfa and Clover Hay with Levels of Available Phosphorus and Potassium. 60
Fertilizing Alfalfa. 34
King Cotton gets a Rival. 33
Response of Alfalfa and Alfalfa-Bromegrass Mixture to Various Cutting Treatments. 16
Studies of Pressure-Head Losses in Concrete Risers and Alfalfa Values. 22
APPARATUS
Apparatus for Control of Moisture, Temperature, and Air Composition in Microbiological Respiration Experiments. 55
ASPHALT
Hot Asphalt Used to Seal Leaks in Roza Canal. 4
Winter Construction of Canal Linings Readily Accomplished using Buried Asphalt Membrane. 43
BACTERIA
The Occurrence of Aerobic Mesophilic Sporeforming Bacteria on Plant Roots. 57
BEEF
Pasture adds More Pounds at Less Expense. 33
BENTONITE
Reactions of Bentonite as Influenced by Adsorbed Cations and Grinding. 53
BIBLIOGRAPHY
Annotated Bibliography on Sedimentation. 37
BORON
Boron Improved Meadow. 43
Boron Uptake by Plants as Influenced by Soil Moisture. 61
Effect of Boron on Nitrogen Fixation by Azotobacter. 13
List of References to Boron Literature-Reviewed January-March 1948. 13
BRUSH CONTROL
Brush Control and Pasture Development in The Red Plains. 36
Recent Developments in the Chemical Control of Brush on Texas Ranges. 13
Southwestern Range Plants - Blackbrush Acacia. 30

CANALS
Hot Asphalt Used to Seal Leaks in Roza Canal. 4
Winter Construction of Canal Linings Readily Accomplished Using Buried Asphalt Membrane. 43
CARBON DIOXIDE
A Method for Determining the Carbon Dioxide Production of Sterile and Nonsterile Root Systems. 56
CATIONIC
Reciprocal Effects of Magnesium and Potassium as Shown by Their Cationic Activities in Four Clays. 53
CATIONS
Reactions of Bentonite as Influenced by Adsorbed Cations and Grinding. 53
CHANNELS
A Graphical Method for Investigating the Stability of Flow in Open Channels or in Closed Conduits Flowing Partly Full. 39
Measuring Water in Irrigation Channels with Parshall Flumes and Small Weirs. 20
Resistance to Flow in Rough Channels. 39
CHEMICALS
Alfalfa - Its Mineral Requirements and Chemical Composition. 43
Chemical Control of Undesirable Southern Hardwoods. 11
Chemicals Used in Weed Killing. 15
Chemical Weed Control. 49
Controlling Weeds in Corn with 2,4-D. 15
Control of Crabgrass (Digitaria Spp.) by The Use of Chemical Sprays. 17
Controlling Cattail with 2,4-D. 18
Decomposition of 2,4-Dichlorophenoxyacetic Acid in Soil and Liquid Media. 55
Effect of Fertilization on the Yield and Chemical Composition of Pasture Forage And Availability of Soil Nutrients. 54
Effect of Soil Acidification on Some Chemical Properties of a Soil and the Plants Grown Thereon. 34
IPC Controls Quackgrass, Grassy Weeds. 20
New Chemical Controls Turf Insects. 40
Recent Developments in the Chemical Control of Brush on Texas Ranges. 13
Recent Research in Poisoning Southern Weed Hardwoods. 48
Sneezeweed Falls Before 2,4-D Sprays. 45
Some Physical and Chemical Properties of Six Virgin and Six Cultivated Iowa Soils. 66

GPO O SCS—253

Page

T C A - A New Quackgrass Killer. 19
The Duration and Effect of 2,4-D Toxicity to Crops Grown on Calcareous Soil Under Controlled Irrigation Conditions. 15

CLASSIFICATION
A New Diagram for the Textural Classification of Soils. 27
Range Condition and Soil Site Classification by Helicopter. 11

CLAYS
Identification of Minerals in Some Clay by X-Ray Diffraction Patterns. 37
Microbial Products and Soil Organic Matter: II. The Effect of Clay on the Decomposition and Separation of the Phosphorus Compounds in Microorganisms. 55
Total Surface of Clays in Polar Liquids as a Characteristic Index. 30

CLIMATE
Nutrition via Soil Fertility According to the Climatic Pattern. 5
The Climate, Soils, and Soil-Plant Relationships of an Area in Southwestern Saskatchewan. 38

CLOVER
Buttonclover, Another of the Great New Plants. 19
Effect of Height and Frequency of Cutting on the Productivity and Survival of Ladino Clover. 16
Fertilizer Pays on Ladino. 33
Inoculation of Crimson Clover (Trifolium Incarnatum L.) with Mixtures of Rhizobia Strains. 57
King Cotton Gets a Rival. 33
Reseeding Crimson Clover Adds New Income for the South. 17

CONSERVATION
A Method of Computing Conservation Benefits of a Range Program. 38
Adaptation of Grasses to Soil and Water Conservation at High Altitudes. 9
Conservation Farming Pays. 29
Conservation as a Movement. 38
For Insurance Against Drought Soil and Water Conservation. 5
Fundamentals in Conservation Research. 1

CONSUMPTIVE USE
Consumptive use of Irrigation Water by Crops in Nevada. 43

COPPER
Copper in Tobacco Production. 22

CORE-SAMPLER
A Hammer-Driven Soil-Core Sampler. 30

CORN
Bermuda Grass can be Used in Corn Rotations. 44
Controlling Weeds in Corn with 2,4-D. 15
Interception Storage of Rainfall by Corn Plants. 24
Population Density of Unirrigated Maize and its Influence upon Fertilizer Efficiency in Central Mexico. 61
Some Results of Mulch Tillage for Corn. 35
The Effect of Various Amounts of Nitrogen, Phosphoric Acid, and Potash on the Yields of Silage Corn. 59
The Influence of Supplemental Irrigation on Corn Yields in Indiana. 66
Weed Control and Corn Yields in 1949. 3

COST-BENEFIT
A Cost-Benefit Analysis of Seeding Abandoned Farm Land to Crested Wheatgrass by the Preparatory Crop Method. 32
Costs and Benefits from Soil Conservation in Northeastern Illinois. 34
Legume and Grasses — Needs, Costs, Problems and Benefits. 25

COTTON
King Cotton gets a Rival. 33

CROPS
Consumptive use of Irrigation Water by Crops in Nevada. 43
Fixation of Nitrogen in Rice Soils by Algae as Influenced by Crop, CO_2, and Inorganic Substances. 37
Physical Soil Factors Governing Crop Growth. 17
The Duration and Effect of 2,4-D Toxicity to Crops Grown on Calcareous Soil Under Controlled Irrigation Conditions. 15

CROP RESIDUE
Keep Crop Residues on Surface of Ground. 61
Machinery for Utilizing Crop Residues for Mulches. 35

CROPPING
Effect of Long-Time Cropping on Soils Properties in Northeastern New Mexico. 21
The Organic Matter and Nitrogen Content and Carbon-Nitrogen Ratio of Cecil Soil as Influenced by Different Cropping Systems on Class II, III and IV Land. 57

CULTIVATION
Influence of Cultivation and Weed Killers in Soil Structure and Crop Yield. 30
The Effect of Long-Time Cultivation on some Physical and Chemical Properties of Two Rendzina Soils. 50

CUTTING
Effect of Height and Frequency of Cutting on the Productivity and Survival of Ladino Clover. 16
Response of Alfalfa and Alfalfa-Bromegrass Mixture to Various Cutting Treatments. 16

DEER
Deer Forage Observations in Utah. 46

DIFFUSION
Field Measurement of Oxygen Diffusion Through Soil. 52
Oxygen Diffusion in Porous Media as a Measure of Soil Aeration. 52

DITCHES
Seepage into Ditches in the Case of a Plane Water Table and an Impervious Substratum. 24

DRAINAGE
A Quantitative Method for Determining Groundwater Characteristics for Drainage Design. 22
A Piezometer Method of Measuring Soil Permeability and Application of Permeability Data to a Drainage Problem. 27

Page

Design and Operation of Drainage Pumping Plants. 29
Drainage Ditchbank Stabilization for Organic Soils. 62
Drainage for Sugarcane Land. 6
Drainage in Conservation Farming. 10
Numerical Solutions for Tile Drainage of Layered Soils. 40
Solving the Drainage Problems in Barrier Areas. 38
Will This Soil Drain? 8

DROUGHT
For Insurance Against Drought Soil and Water Conservation. 5

EARTHWORMS
Influence of Earthworms on Soil Microorganisms. 10
The Influence of Earthworms on Soil Aggregation. 28

ECOLOGICAL
Cheatgrass (Bromus Tectorum L.) - An Ecological Intruder in Southern Idaho. 45
Ecological Bases for Land Use Planning in Gulf Coast Marshlands. 10

ECONOMICS
An Economic Appraisal of Anhydrous Ammonia as a Nitrogenous Fertilizer. 18
Conservation Farming Pays. 29
Summary of Records from 128 Farms on Slowly Permeable Soils in Northeastern Illinois, 1949. 49

EQUIPMENT
A Recording Soil Penetrometer. 39
A Simplified Air-Picnometer for Field Use. 52
Some Tests of a Four-Electrode Probe for Soil Moisture Measurement. 51
The Dawson Planting Tool. 62
Uses and Modifications for the "Moosehorn" Crown Closure Estimator. 47

EROSION CONTROL
Erosion of Topsoil Reduced Productivity. 44
Grass Holds Our Future. 4
Seasonal Occurrence of Runoff and Erosion from a Sandy Soil in Vegetable Production. 10
Soil Erosion Controllers for Grated Irrigation Pipe. 1
Soil Losses as Affected by Cover, Rainfall, and Slope. 66
Streambank Erosion Control on the Winooski River, Vermont. 7

EVAPORATION
A Review of Evaporation Theory and Development of Instrumentation. 18
An Investigation of Evaporation from Irrigation Sprays. 26
Getting the Evidence on Evaporation. 62

FARMING
Basic Teachings of Jordan Plots Easily Translated into Useful Farm Practices. 25
Conservation Farming Pays. 29
Development Farms on Reclamation Projects. 8
Drainage in Conservation Farming. 10

Page

Farm Leasing Practices on 41 Rented Farms in the Northeastern Illinois Slowly Permeable Subsoil Area. 29
Garden Farming in Japan. 20
Grassland Farming. 3
Grassland Farming Increases Need for Potash Conservation. 40
Some Records of Grassland Farming in Wisconsin and Minnesota. 35
Summary of Records from 128 Farms on Slowly Permeable Soils in Northeastern Illinois, 1949. 49

FELDSPARS
The Plagioclase Feldspars as an Index to Soil Weathering. 63

FERTILIZERS
An Economic Appraisal of Anhydrous Ammonia as a Nitrogenous Fertilizer. 18
Development of a Dispenser for Applying Radioactive Phosphate Fertilizer. 21
Effect of Fertilization and Cultural Practices on Growth and Yield of Concord Grapevines. 15
Effect of Fertilizers and Lime on Emergence, Nitrogen Content, and Ratio of Roots to Tops in Hairy Vetch. 36
Effect of Fertilization on the Yield and Chemical Composition of Pasture Forage and Availability of Soil Nutrients. 54
Fertilizer Experiments and Crop Yields in Japan and Some Comparisons with Those in the United States. 19
Fertilizing Alfalfa. 34
Liquid Ammonia Treatments of Composted Fertilizers. 62
Metering Dry Fertilizers and Soil Amendments into Irrigation Systems. 3
Nutrition via Soil Fertility According to the Climatic Pattern. 5
Population Density of Unirrigated Maize and its Influence Upon Fertilizer Efficiency in Central Mexico. 61
Relation of Soil Fertility and Rate of Growth of Mixed Oak Stands in the Driftless Area of Southwestern Wisconsin. 64
Some Effects of Salt Water on Soil Fertility. 61
Soil and Water Losses Reduced by Improved Fertility. 4
Self-Propelled Fertilizer Side-Dresser. 29
Some Fertilizer Experiments with Deciduous Forest Tree Seedlings on Several Iowa Soils. 29
The Effectiveness of Manure and Commercial Fertilizers in Restoring the Productivity of Subsoils Exposed by Leveling. 16
The Effect of Fertilizer and Seeding on the Establishment of Grazed Firebreaks. 31
The Effect of Nitrogenous Fertilizers Applied to Soil on the Formation of Nitrates, the Availability of Phosphates, and Soil Reaction. 58
The Effects of Fertilizer Treatments upon Yield and Composition of Wheat Forage. 60

Page

Utilization of Fertilizer and Soil Phosphorus by Soybeans. 59

FIELD ARRANGEMENT
Outline of Studies and Present Field Arrangement. 28

FIREBREAKS
The Effect of Fertilizer and Seeding on the Establishment of Grazed Firebreaks. 31

FLOOD CONTROL
Taming Runaway Waters. 15
Use of Historical Data in Flood-Frequency Analysis. 24

FLOW
A Graphical Method for Investigating the Stability of Flow in Open Channels or in Closed Conduits Flowing Partly Full. 39
Fluid Resistance of Composite Roughness. 40
Resistance to Flow in Rough Channels. 39

FLUORINE
Comparative Fluorine Uptake by Plants in Limes and Unlimed Soil. 37

FORAGES
Appraising Desert Range Forage for Sheep. 22
Birdsfoot Trefoil - A Promising Forage Plant. 8
Deer Forage Observations in Utah. 46
Determining Forage Weight on Southern Forest Ranges. 45
Effect of Fertilization on the Yield and Chemical Composition of Pasture Forage and Availability of Soil Nutrients. 54
First-Year Effects of Logging on Forage Production. 1
New Forage Varieties for North Carolina. 34
The Effect of Fertilizer Treatments Upon Yield and Composition of Wheat Forage. 60
The Production and Utilization of Perennial Forage in North Georgia. 18
Use of California Annual-Plant Forage by Range Rodents. 46
Utilizing Forage on Longleaf Pine Forest Ranges. 45

FORESTRY
A Preplanting Forest Soil Survey. 2
Concentrated Sprays for Application by Mist Blowers for Control of Forest, Shade and Fruit Tree Pests. 32
Correlation Between Certain Soil Characteristics and Site for Douglas-Fir in Northwestern Washington. 64
Effect of Some Physical Soil Properties on Douglas-Fir Site Quality. 23
Forest Grazing Work in the Deep South. 45
Forest Survey Procedures for Area and Volume Determinations. 31
Oxidation-Reduction Potential as a Characteristics of Forest Humus Types. 64
Practical Guides for Seeding Grass on Skid Roads, Trials, and Landings, Following Logging on Eastside Forests of Washington and Oregon. 45
Some Factors Affecting Humus Development in the Northeast. 16
Some Fertilizer Experiments with Deciduous Forest Tree Seedlings on Several Iowa Soils. 29
The Influences of Forest Lands Upon the Water Resources in the Missouri Basin. 9

FREEZING POINT
Some Freezing Point Depression Measurements on Cores of Soil in Which Cotton and Sunflower Plants were Wilted. 51

FUNGI
Effect of Soil Fungi on Germination of Sweet Orange Seeds and Development of the Young Seedlings. 56

GRASSES
Adaptation of grasses to Soil and Water Conservation at High Altitudes. 9
Airplane Seeding of Sand Lovegrass. 5
Alta Fescue for High-Yielding Pastures. 9
Bermuda Grass Can be Used in Corn Rotations. 44
Cheatgrass (Bromus Tectorum L.) - An Ecological Intruder in Southern Idaho. 45
Competition Between Sagebrush Seedlings and Reseeded Grasses. 47
Dryland Grass Seeding in Wyoming. 42
Effects of Different Intensities of Grazing on Depth and Quality of Roots of Grasses. 11
Effects of Herbage Removal at Various Dates on Vigor of Bluebunch Wheatgrass and Arrowleaf Balsamroot. 46
Estimating Perennial Grass Utilization on Semi-Desert Cattle Ranges by Percentage of Ungrazed Plants. 32
Grass Holds Our Future. 4
Grass Seed Production in Nebraska. 22
Grass Seed Production. 39
Legumes and Grasses - Needs, Costs, Problems, and Benefits. 25
New Grasses for the Western Range. 24
Pore Space and Aggregation in a Chernozem Soil as Affected by Age of Perennial Grass Sod. 35
Practical Guides for Seeding Grass on Skid Roads, Trials, and Landings, Following Logging on Eastside Forests of Washington and Oregon. 45
Rancher! Crested Wheatgrass is What you Want. 41
Renovating Wisconsin's Bluegrass Pasture. 6
Response of Alfalfa and Alfalfa-Bromegrass Mixture to Various Cutting Treatments. 16
Results of Preliminary Tests of Pelletized Crested Wheatgrass Seed. 45
Sagebrush to Grass. 47
Seeding Ranges to Grass Requires Proper Methods and Hardy Varieties. 41
Tall Meadow Fescue in Ohio. 2
Tilth of Corn-Belt Soils Cannot be Maintained without legumes and Grasses. 15
Using Bluegrass on Ohio Farms. 19
Year-Round Green. 8

GRASSLAND
Effects of Thirty Years of Protection From Grazing in Desert Grassland. 14
Grassland Farming. 3

Page

Grassland Farming Increases Need for Potash Conservation. 40
Shrub Invasion of Southern Arizona Desert Grassland. 32
Some Records of Grassland Farming in Wisconsin and Minnesota. 35

GRAPEVINES
Effect of Fertilization and Cultural Practices on Growth and Yield of Concord Grapevines. 15

GRAZING
Effects of Different Intensities of Grazing on Depth and Quality of Roots of Grasses. 11
Effect of Thirty-Years of Protection From Grazing in Desert Grassland. 14
Forest Grazing Work in the Deep South. 45
Forest Grazing in South Alabama and West Florida. 47
Grazing Spring-Fall Sheep Ranges of Southern Idaho. 44
Herd Performance on Kentucky 31 Fescue. 2
How Grazing Capacity of Mountain Range Lands is Affected by Range Condition and Usability. 2
Some Effects of Herbicides on Pasture and on Grazing Livestock. 3

GROUND WATER
A Quantitative Method for Determining Groundwater Characteristics for Drainage Design. 22
Electro-Chemical Properties of Ground Water in Major Types of Wisconsin Organic Soils. 62
Growth of Trembling Aspen in Relation to Ground Water and Soil Organic Matter. 65
The Equilibrium of Rain-Fed Ground-Water Resting on Deeper Saline Water: The Ghyben-Herzberg Lens. 27

GUMBOTIL
On the Origin of Gumbotil. 63

HUMUS
Some Factors Affecting Humus Development in the Northeast. 16
The Influence of Humus on Soil Aggregation. 28

HYDRAULICS
Hydraulic Model Studies for Whiting Field Naval Air Station. 26
Hydrologic Characteristics of South Carolina Piedmont Forest Soils. 65
Hydrologic Problems Concerning the Runoff in Headwater Regions. 25

INOCULATION
Inoculation of Crimson Clover (Trifolium Incarnatum L.) with Mixtures of Rhizobia Strains. 57

INSECTICIDES
A New Systemic Insecticide. 44
Agricultural Insecticides. 14
Are Insecticides Toxic to Soil Microorganisms? 41

Page

INTENSITY-FREQUENCY
The Intensity-Frequency of Kansas Winds. 7

IRRIGATION
A Practical Method of Determining Proper Lengths of Runs, Sizes of Furrow Streams and Spacing of Furrows on Irrigated Lands. 34
An Investigation of Evaporation from Irrigation Sprays. 26
Consumptive Use of Irrigation Water by Crops in Nevada. 43
Development Farms on Reclamation Projects. 8
Effect of Irrigation on the Yield of Snapbeans, Sweet Corn and Tomatoes as Influenced by Certain Cultural Practices in 1949. 17
Friction Losses in Selected Valves and Fittings for Irrigation Pumping Plants. 33
Irrigated Pastures in California. 4
Irrigated Soils Need Good Management. 20
Irrigation Trials in Western North Dakota. 29
Irrigation and Variety Trails with Lettuce in the Lower Rio Grande Valley. 35
Measuring Water in Irrigation Channels with Parshall Flumes and Small Weirs. 20
Metering Dry Fertilizers and Soil Amendments into Irrigation Systems. 3
Pumping for Irrigation. 32
Quality of Water in the Sevier Changes from Upper to Lower Basins. 41
Snow Surveys and Irrigation Water Forecasts for Columbia Basin. 8
Soil Erosion Controllers for Grated Irrigation Pipe. 1
Soil Survey Data as a Basis for the Assessment of Irrigation District Lands. 64
The Application of the Profit-Water Curve to Irrigation Projects. 26
The Duration and Effect of 2,4-D Toxicity to Crops Grown on Calcareous Soil Under Controlled Irrigation Conditions. 14
The Influence of Supplemental Irrigation on Corn Yields in Indiana. 66

JAPAN
Fertilizer Experiments and Crop Yields in Japan and Some Comparisons with Those in the United States. 19
Garden Farming in Japan. 20
Land Use and Soil Conservation in Japan. 43

JAPANESE BEETLE
The Effect of Milky Disease on Japanese Beetle Populations over a Ten-Year Period. 19

LAND
Controlling Water on the Land. 10
Drainage for Sugarcane Land. 6
Ecological Bases for Land Use Planning in Gulf Coast Marshlands. 10
Five Years of Sustained-Yield Operation. 12
Land Use and Trout Streams. 38

Page

Land Use and Soil Conservation in Japan. 43
Recent Trends in the Use of the Land-Capability Classification. 66

LEACHING
Effect of Various Leaching Treatments on Growth of Orange Seedlings in Old Citrus Soils. 30

LEGUMES
Band Seeding Gives Better Legume Stands. 9
Legumes and Grasses — Needs, Costs, Problems, and Benefits. 25
Strains of Rhizobium Effective on the Trefoils, Lotus Corniculatus and Lotus Uliginosus. 56
Structure Improvement Following Legume Growth on Unfertilized Subsoil. 65
Tilth of Corn-Belt Soils Cannot be Maintained Without Legumes and Grasses. 15

LETTUCE
Irrigation and Variety Trails with Lettuce in the Lower Rio Grande Valley. 35

LIME
Effect of Fertilizers and Lime on Emergence, Nitrogen Content, and Ratio of Roots to Tops in Hairy Vetch. 36
Getting Better Records of Vegetation Changes with the Line Interception Method. 46
Lime Requirement of Several Red and Yellow Soils as Influenced by Organic Matter and Mineral Composition of Clays. 53

LIMESTONE
The Effect of Varying Amounts of Ground Limestone on the pH and Base Exchange Properties of Sassafras Fine Sandy Loam. 54

LININGS
Bury the Lining. 62
Holding Water in Farm Ponds. 42
Hot Asphalt Used to Seal Leaks in Roza Canal. 4
Sealing Farm Ponds. 1
Winter Construction of Canal Linings Readily Accomplished Using Buried Asphalt Membrane. 43

LIVESTOCK
Herd Performance on Kentucky 31 Fescue. 2
Pasture - - - Staff of Life for Livestock. 33
Some Effects of Herbicides on Pasture and on Grazing Livestock. 3
Weight and Gain of Range Calves as Affected by Rate of Stocking. 47

LOGGING
First-Year Effects of Logging on Forage Production. 1
Practical Guide for Seeding Grass on Skid Roads, Trials and Landings Following Logging on Eastside of Washington and Oregon. 45

Page

LOSSES
Maintenance of Soil Organic Matter: II. Losses of Carbon and Nitrogen from Young and Mature Plant Materials During Decomposition in Soil. 21
Soil and Water Losses Reduced by Improved Fertility. 4
Studies of Pressure-Head Losses in Concrete Risers and Alfalfa Values. 22

LYSIMETER
A Lysimeter Investigation of Gains, Losses, and Balance of Salts and Plant Nutrients in an Irrigated Soil. 61

MACHINERY
Machinery for Utilizing Crop Residues for Mulches. 35
Machinery Problems in Mulch Farming. 35
Row Crop Weed Control with a Shielded Boom. 18
Self-Propelled Fertilizer Side-Dresser. 29
Tractor Use Effects on Volume Weight of Davidson Loam. 2

MAGNESIUM
Reciprocal Effects of Magnesium and Potassium as Shown by their Cationic Activities in Four Clays. 53

MANURE
The Effectiveness of Manure and Commercial Fertilizer in Restoring the Productivity of Subsoils Exposed by Leveling. 16

MEADOW
Boron Improved Meadow. 43

MESQUITE
Merriam Kangaroo Rat a Factor in Mesquite Propagation on Southern Arizona Range Lands. 47

METHODS
A Direct Method of Computing and Correcting the Equivalent Depth of Water in a Soil Column. 22
A Graphical Method for Investigating the Stability of Flow in Open Channels or in Closed Conduits Flowing Partly Full. 39
A Method of Computing Conservation Benefits of a Range Program. 38
A Piezometer Method of Measuring Soil Permeability and Application of Permeability Data to a Drainage Problem. 27
A Practical Method of Determining Proper Lengths of Runs, Sizes of Furrow Streams and Spacing of Furrows on Irrigated Lands. 34
A Quantitative Method for Determining Groundwater Characteristics for Drainage Design. 22
A Study of Sampling Methods Used in Determining the Productivity of Illinois Soils. 26
Field Methods Used to Demonstrate Range Conservation. 11
Seeding Ranges to Grass Required Proper Methods and Hardy Varieties. 41

Page

MICROORGANISMS
Are Insecticides Toxic to Soil Microorganisms? 41
Influence of Earthworms on Soil Microorganisms. 10
Relations of Microorganisms to Transformations of Sulfur in Soils. 34
Stubble Mulch Studies: III. Influence of Soil Microorganisms and Crop Residues on the Germination, Growth and Direction of Root Growth of Corn Seedlings. 57

MILKY DISEASE
The Effect of Milky Disease on Japanese Beetle Populations Over a Ten-Year Period. 19

MINERALS
Alfalfa - Its Mineral Requirements and Chemical Composition. 18
Alfalfa - Its Mineral Requirements and Chemical Composition. 43
Identification of Minerals in Some Clay by X-Ray Diffraction Patterns. 37
Lime Requirement of Several Red and Yellow Soils as Influenced by Organic Matter and Mineral Composition of Clays. 53
Mineral Composition of the Clay Fraction: II. Of Several Coastal Plain, Piedmont, and Mountain Soils of North Carolina. 53
Segregation Procedure for the Mineralogical Analysis of Soils. 53
The Calcium-Potassium Relationships of Clay Minerals as Revealed by Activity Measurements. 53

MOISTURE
Boron Uptake by Plants as Influenced by Soil Moisture. 61
Moisture Characteristics of Some Hawaiian Soils. 51
Some Tests of a Four-Electrode Probe for Soil Moisture Measurement. 51
The Effects of Moisture, Spacing, Fertility and Their Interrelations on Sugar Beet Production. 43

MULCHES
Application of the Double-Cut Plow Principle to Mulch Tillage. 35
Machinery for Utilizing Crop Residues for Mulches. 35
Machinery Problems in Mulch Farming. 35
Mulches for Blueberries. 49
Some Results of Mulch Tillage for Corn. 35
Wood Wastes Make Valuable Soil Mulches. 20

MULCHING
Effect of Mulching Fall Grown Potatoes, Yuma Mesa, 1948-1949. 20

MYCORRHIZAE
Some Effects of Mycorrhizae on the Phosphorus Nutrition of Monterey Pine Seedlings. 65

NITROGEN
Effect of Boron on Nitrogen Fixation By Azotobacter. 13
Effect of Fertilizers and Lime on Emergence, Nitrogen Content, and Ratio of Roots to Tops in Hairy Vetch. 36
Estimating the Nitrogen Delivery of Soil from the Organic Matter Determination as Reflected by Sanborn Field. 58
Liquid Ammonia Treatments of Composted Fertilizers. 62
Fixation of Nitrogen in Rice Soils by Algae as Influenced by Crop, CO_2, and Inorganic Substances. 37
Preliminary Report of the Yeast Fermentative Procedure for the Estimation of Available Soil Nitrogen and General Fertility Level. 59

NODULAR GROWTHS
The Anatomy of the Nodular Growths on the Roots of Tribulus Cistoides L. 56

NUTRIENTS
A Lysimeter Investigation of Gains, Losses, and Balance of Salts and Plant Nutrients in an Irrigated Soil. 61
Nutrient Competion in Plant Associations. 9
Nutrient Deficiencies Diagnosed with Foliar Analyses and Plant Tissue Tests. 36

NUTRITION
Nutrition via Soil Fertility According to the Climatic Pattern. 5

ORGANIC MATTER
Estimating the Nitrogen Delivery of Soil from the Organic Matter Determination as Reflected by Sanborn Field. 58
Growth of Trembling Aspen in Relation to Ground Water and Soil Organic Matter. 65
Maintenance of Soil Organic Matter: II. Losses of Carbon and Nitrogen from Young and Mature Plant Materials During Decomposition in Soil. 21
Modification of the Smith-Weldon wet Combustion Procedure for the Micro Determination of Soil Organic Matter. 36
Physical Properties of Sassafras Silt Loam as Affected by Long-Time Organic Matter Additions. 50
Some Observations on the Oxidation of Soil Organic Matter in the Presence of Alkali. 28
The Organic Matter and Nitrogen Content and Carbon-Nitrogen Ratio of Cecil Soil as Influenced by Different Cropping Systems on Class II, III and IV Land. 57
Wood Waste Lignins to Produce Soil Organic Matter of a Stable Nature. 58

PASTURE
Alta Fescue for High-Yielding Pastures. 9
Brush Control and Pasture Development in the Red Plains. 36
Irrigated Pastures in California. 4
Pasture Adds More Pounds at Less Expense. 33
Our "Miracle" Pasture Plant. 33

Page

Pasture - - - Staff of Life for Livestock. 33
Renovating Wisconsin's Bluegrass Pasture. 6
Seed Pasture on Those "Lofing" Acres. 33
Seed Pasture and Give your Soil a Break. 33
Some Effects of Herbicides on Pasture and on Grazing Livestock. 3
The Virginia Pasture Program. 3

PERMEABILITY
A Falling Head Permeameter for Evaluating Permeability. 31
A Piezometer Method of Measuring Soil Permeability and Application of Permeability Data to a Drainage Problem. 27
Measurement of the Air Permeability of Soil in Situ. 52
Permeability Studies on Some Illinois Soils. 5
Permeability Studies on Some Illinois Soils. 52

PERCOLATION
Relation of Percolation Rates Through Saturated Soil Cores to Volume of Pores Drained in 15 and 30 Minutes Under 60 Centimeters Tension. 65

PHOSPHORUS
Correlation of Yield and Quality of Alfalfa and Clover Hay with Levels of Available Phosphorus and Potassium. 60
Rock Phosphate Studies with Neutron Irradiated Rock Phosphate. 59
Some Effects of Mycorrhizae on the Phosphorus Nutrition of Monterey Pine Seedlings. 65
The Effect of Various Amounts of Nitrogen, Phosphoric Acid, and Potash on the Yields of Silage Corn. 59
The Mineralization of Organic Phosphorus, Nitrogen, and Carbon in Clarion and Webster Soils. 54
Utilization of Fertilizer and Soil Phosphorus by Soybeans. 59

PINE
A Method of Forecasting Annual Variations in Seed Crop for Loblolly Pine. 17
Effect of Soil on the Development of Hardwood Understories in Pine Stands of the Piedmont Plateau. 65
Influence of Eastern Red Cedar on Soil in Connecticut Pine Plantations. 37
Management of Natural Slash Pine Stands in the Flatwoods of Southern Georgia and North Florida. 37
Relation Between Soil Characteristics and Site Index of Loblolly Pine in the Coastal Plain Region of Virginia and the Carolinas. 12
Some Effects of Mycorrhizae on the Phosphorus Nutrition of Monterey Pine Seedlings. 65
Utilizing Forage on Longleaf Pine Forest Ranges. 45

PLANTS
A Lysimeter Investigation of Gains, Losses, and Balance of Salts and Plant Nutrients in an Irrigated Soil. 61
Birdsfoot Trefoil - A Promising Forage Plant. 8
Boron Uptake by Plants as Influenced by Soil Moisture. 61
Buttonclover, Another of the Great New Plants. 19
Comparative Fluorine Uptake by Plants in Limed and Unlimed Soil. 37
Effect of Soil Acidification on Some Chemical Properties of a Soil and the Plants Grown Thereon. 34
Estimating Perennial Grass Utilization on Semidesert Cattle Ranges by Percentage of Ungrazed Plants. 32
Maintenance of Soil Organic Matter: II. Losses of Carbon and Nitrogen from Young and Mature Plant Materials During Decomposition in Soil. 21
Nutrient Competion in Plant Associations. 9
Nutrient Deficiencies Diagnosed with Foliar Analyses and Plant Tissue Tests. 36
Radioactive Materials as Plant Stimulants - Field Results. 16
Relative Capacity of Soils to Furnish Ions to Plants. 23
Some Probable Future Developments in Control of Noxious Range Plants. 46
Stock-Poisoning Plants of the Eastern Seaboard. 47

POLLINATION
Pollination - An Agricultural Practice. 4

PONDS
Holding Water in Farm Ponds. 42
Sealing Farm Ponds. 1

POTASH
Grassland Farming Increases Need for Potash Conservation. 40
The Effect of Various Amounts of Nitrogen, Phosphoric Acid, and Potash on the Yields of Silage Corn. 59

POTASSIUM
Available Nonexchangeable Soil Potassium at Three Northern Great Plains Locations by a Neubauer Procedure. 53
Correlation of the Potassium Content of Alfalfa With that Available in Soils. 60
Nonexchangeable Potassium Removal from Soils by Successive Acid Extractions as Related to Removal by Greenhouse Crops. 54
Reciprocal Effects of Magnesium and Potassium as Shown by Their Cationic Activities in Four Clays. 53

PRODUCTIVITY
A Study of Sampling Methods Used in Determining the Productivity of Illinois Soils. 26
Effect of Height and Frequency of Cutting on the Productivity and Survival of Ladino Clover. 16
Erosion of Topsoil Reduces Productivity. 44

Page

Measurement of the Productivity of Soils Under Various Environmental Conditions. 23
The Effectiveness of Manure and Commercial Fertilizer in Restoring the Productivity of Subsoils Exposed by Leveling. 16
PUDDLE EROSION
Puddle Erosion - Soil Conservation vs Mud Conservation. 31
PUMPING PLANTS
Design and Operation of Drainage Pumping Plants. 29
Friction Losses in Selected Valves and Fittings for Irrigation Pumping Plants. 33
Pumping for Irrigation. 32

RADIOACTIVE MATERIALS
Development of a Dispenser for Applying Radioactive Phosphate Fertilizer. 21
Radioactive Materials as Plant Stimulants - Field Results. 16
RADIOISOTOPES
The Use of Radioistopes for the Measurement of the Water Equivalent of Snow Pack. 24
RAINDROP EROSION
Friend or Enemy? 25
More About Raindrop Splash Erosion. 26
RAINFALL
Interception Storage of Rainfall by Corn Plants. 24
Rainfall Interception by Chaparral in California. 23
Soil Losses as Affected by Cover, Rainfall and Slope. 66
RANGES
A Method of Computing Conservation Benefits of a Range Program. 38
Appraising Desert Range Forage for Sheep. 22
Determining Forage Weight on Southern Forest Ranges. 45
Establishment of Vegetation on Depleted Subalpine Range as Influenced by Microenvironment. 46
Estimating Perennial Grass Utilization on Semidesert Cattle Ranges by Percentage of Ungrazed Plants. 32
Field Methods Used to Demonstrate Range Conservation. 11
Grazing Spring-Fall Sheep Ranges of Southern Idaho. 44
How Grazing Capacity of Mountain Range Lands is Affected by Range Condition and Usability. 2
Management of Reseeded Ranges. 12
Mechanical Treatments on Wyoming Range Land. 32
Merriam Kangaroo Rat a Factor in Mesquite Propagation on Southern Arizona Range Lands. 47
New Grasses for the Western Range. 24
Outline Guide for Reseeding Ranges in Southern Idaho. 48
Progress in Range Management. 48

Page

Range Condition and Soil Site Classification by Helicopter. 11
Range Research Contributions. 47
Range Reseeding. 48
Recent Developments in the Chemical Control of Brush on Texas Ranges. 13
Seeding Ranges to Grass Requires Proper Methods and Hardy Varieties. 41
Stocking Northern Great Plains Sheep Range for Sustained High Production. 44
The Santa Rita Experimental Range. 49
RESEARCH
Fundamentals in Conservation Research. 1
Outline of Studies and Present Field Arrangement. 28
Range Research Contributions. 47
Recent Research in Poisoning Southern Weed Hardwoods. 48
Reseeding Research. 48
RESEEDING
Management of Reseeded Ranges. 12
Outline Guide for Reseeding Ranges in Southern Idaho. 48
Preliminary Guide for Range Reseeding in Arizona and New Mexico. 46
Range Reseeding. 48
Reseeding Crimson Clover Adds New Income for the South. 17
Reseeding Research. 48
REPORTS
1948 Progress Report and Review of Results. 6
1949 Annual Report, Moden Demonstration Farm, Froid, Montana. 11
1949 Annual Report for the Midwest Claypan Soil Conservation Experiment Farm, McCredie, Missouri. 14
Progress Report, 1945-49 - Southeast Oklahoma Pasture-Fertility Research Station. 13
Progress Report, 1950 - Soil and Water Conservation Research at the Red Plains Conservation Experiment Station, Guthrie, Oklahoma. 19
Progress Report, 1950 - Soil and Water Conservation Research at the Wheatland Conservation Experiment Station Cherokee, Oklahoma. 19
Preliminary Report of the Yeast Fermentative Procedure for the Estimation of Available Soil Nitrogen and General Fertility Level. 59
Report on 1940 Study of Shelterbelt Influence on Crop Yields with Summary of Data 1935 to 1940 Inclusive. 37
Research Report No. 178 - The Effect of Soil Fumigats and Nitrogen Levels on Early Dying of Potatoes. 14
Research Report No. 185 - Soil Management and Irrigation Investigations in the Columbia Basin. 14
Sixth Annual Report, Soil Conservation Experimental Farm, Page County, Iowa, 1949. 12
Tenth Year Progress Report Field Tests

Page

of Farm Woodland Practices Tree Planting Studies. 7

RHIZOBIUM

Some Effects of Streptomyces Albus and Penicillium spp. on Rhizobium Meliloti. 57

Strains of Rhizobium Effective on the Trefoils, Lotus Corniculatus and Lotus Uliginosus. 56

RISERS

Studies of Pressure-Head Losses in Concrete Risers and Alfalfa Values. 22

RODENTS

Use of California Annual Plant Forage by Range Rodents. 46

ROOTS

A Method for Determining the Carbon Dioxide Production of Sterile and Nonsterile Root Systems. 56

Effects of Different Intensities of Grazing on Depth and Quality of Roots of Grasses. 11

Effect of Fertilizers and Lime on Emergence, Nitrogen Content, and Ratio of Roots to Tops in Hairy Vetch. 36

The Anatomy of the Nodular Growth on the Roots of Tribulus Cistoides L. 56

The Occurrence of Aerobic Mesphilic Sporeforming Bacteria on Plant Roots. 57

RUNOFF

Hydrologic Problems Concerning the Runoff in Headwater Regions. 25

Seasonal Occurrence of Runoff and Erosion from a Sandy Soil in Vegetable Production. 10

SAGEBRUSH

Competition between Sagebrush Seedlings and Reseeded Grasses. 47

Sagebrush to Grass. 47

SEDIMENTATION

Annotated Bibliography on Sedimentation. 37

The Dynamic Concept of Sediment Sources. 39

SEED

Effect of Soil Fungi on Germination of Sweet Orange Seeds and Development of the Young Seedlings. 56

Grass Seed Production in Nebraska. 22

Grass Seed Production. 39

Pollination - An Agricultural Practice. 4

Results of Preliminary Tests of Pelletized Crested Wheatgrass Seed. 45

SEEDING

A Cost-Benefit Analysis of Seeding Abandoned Farm Land to Crested Wheatgrass by the Preparatory Crop Method. 32

Airplane Seeding of Sand Lovegrass. 5

Band Seeding Gives Better Legume Stands. 9

Dryland Grass Seeding in Wyoming. 42

Practical Guides for Seeding Grass on Skid Roads, Trials, and Landings, Following Logging on Eastside Forests of Washington and Oregon. 45

Seeding Ranges to Grass Requires Proper Methods and Hardy Varieties. 41

Page

The Effect of Fertilizer and Seeding on the Establishment of Grazed Firebreaks. 31

Will Pellet Seeding Work? 17

SEEDLINGS

Competition Between Sagebrush Seedlings and Reseeded Grasses. 47

Effect of Soil Fungi on Germination of Sweet Orange Seeds and Development of the Young Seedlings. 56

Effect of Various Leaching Treatments on Growth of Orange Seedlings in Old Citrus Soils. 30

Some Fertilizer Experiments with Deciduous Forest Tree Seedlings on Several Iowa Soils. 29

SHRUB

Shrub Invasion of Southern Arizona Desert Grassland. 32

SILT

Solving the Silt Mystery. 39

The Silt Load of Texas Streams, 1948-1949, Progress Report No. 11. 43

SITE INDEX

Relation Between Soil Characteristics and Site Index of Loblolly Pine in the Coastal Plain Region of Virginia and The Carolinas. 12

SNOW

Induced Snow Drifting for Water Storage. 9

Snow Surveys and Irrigation Water Forecasts for Columbia Basin. 8

The Use of Radioisotopes for the Measurement of the Water Equivalent of Snow Pack. 24

SODIUM TRICHLOROACETATE

Studies on the Persistence and Movement of Sodium Trichloroacetate in the Soil. 25

SOILS

A New Diagram for the Textural Classification of Soils. 27

An Improved Procedure for the Preparation and Interpretation of X-Ray Analyses of Soils by Means of the Geiger Counter-X-Ray Spectrometer. 66

Application of Soil Tests, Tissue Tests and Foliar Analysis to Field Experiments. 60

Collect Soil Profiles - A Useful Hobby. 21

Control of Soil Drifting on Canada's Prairies. 8

Correlation Between Certain Soil Characteristics and Site for Douglas-Fir in Northwestern Washington. 64

Decomposition of 2,4-D-Dichlorophenoxyacetic Acid in Soil and Liquid Media. 55

Effect of Long-Time Cropping on Soil Properties in Northeastern New Mexico. 21

Effect of Some Physical Soil Properties on Douglas-Fir Site Quality. 23

Effect of Soil Acidification on Some Chemical Properties of a Soil and the Plants Grown Thereon. 34

Page

Effect of Soil on the Development of Hardwood Understories in Pine Stands of the Piedmont Plateau. 65
Electro-Chemical Properties of Ground Water in Major Types of Wisconsin Organic Soils. 62
Field Measurement of Oxygen Diffusion Through Soil. 52
Genesis and Classification of Red-Yellow Podzolic Soils. 63
Influence of Eastern Red Cedar on Soil in Connecticut Pine Plantations. 37
Irrigated Soils Need Good Management. 20
Know Your Soil. - II. Evesboro Loamy Fine Sand - III. Sassafrass Sand. 8
March of Water-Stable Aggregation with Relation to Initial Soil Particle Size. 66
Measurement of the Air Permeability of Soil in Situ. 52
Measurement of the Productivity of Soils Under Various Environmental Conditions. 23
Moisture Characteristics of Some Hawaiian Soils. 51
Our Teeth and Our Soils. 7
Oxygen Diffusion in Porous Media as a Measure of Soil Aeration. 52
Permeability Studies on Some Illinois Soils. 5
Permeability Studies on Some Illinois Soils. 52
Physical and Chemical Characteristics of Slick-Spot Soils. 12
Physical Soil Factors Governing Crop Growth. 17
Physical Properties of Sassafras Silt Loam as Affected by Long-Time Organic Matter Additions. 50
Physical Properties of Soils as Modified by Crops and Management. 65
Principles of Soil Physics in Relation to Tillage. 26
Properties of Soil Which Influence Wind Erosion: II. Dry Aggregate Structure As an Index of Erodibility. 21
Relation Between Soil Characteristics and Site Index of Loblolly Pine in the Coastal Plain Region of Virginia and The Carolinas. 12
Relative Capacity of Soils to Furnish Ions to Plants. 23
Seed Pasture and Give your Soil a Break. 33
Segregation Procedure for the Mineralogical Analysis of Soils. 53
Soil Losses as Affected by Cover, Rainfall, and Slope. 66
Some Physical and Chemical Properties of Six Virgin and Six Cultivated Iowa Soils. 66
Some Physical Changes Accompanying Prairie, Wiesenboden and Planosol Soil Profile Development From Peorian Loess in Southwestern Iowa. 63
Some Soil Catena Relationships in Saline County, Kansas. 63
Studies on the Persistence and Movement of Sodium Trichloroacetate in the Soil. 25
Suitability of Various Soils for Tung Production. 36
The Climate, Soils, and Soil-Plant Relationships of an Area in Southwestern Saskatchewan. 38
The Effect of Nitrogenous Fertilizers Applied to Soil on the Formation of Nitrates, the Availability of Phosphates, and Soil Reaction. 58
The Plagioclase Feldspars as an Index to Soil Weathering. 63
The Variability of Soil Properties in Relation to Stage of Profile Development. 63
Trends in Soil Classification and Correlation at the Series Level. 64
Water-Stable Aggregation in Artificially Saline and Saline-Alkali Soils. 55
Will This Soil Drain? 8

SOIL CONSERVATION
Costs and Benefits from Soil Conservation in Northeastern Illinois. 34
Flatland Soil Conservation. 42
Land Use and Soil Conservation in Japan. 43
Puddle Erosion - Soil Conservation vs Mud Conservation. 31

SOIL SURVEY
A Preplanting Forest Soil Survey. 2
Enlarging the Use of Soil Survey Maps and Reports. 49
Soil Survey - A Firm Footing for Fair Taxes. 21
Soil Survey Data as a Basis for the Assessment of Irrigation District Lands. 64

SPLASH EROSION
More About Raindrop Splash Erosion. 26
Splash Erosion in Pictures. 10

SPRAYS
Concentrated Sprays for Application by Mist Blowers for Control of Forest, Shade and Fruit Tree Pests. 32
Control of Crabgrass (Digitaria Spp.) By the Use of Chemical Sprays. 17
Effect of Fruit Setting Treatment, Variety and Solar Radiation on Yield and Fruit Size of Greenhouse Tomatoes. 6
Sneezeweed Falls Before 2,4-D Sprays. 45
Some Effects of Spray Residues on the pH and the basic Cations of the Soil, in Northeastern McIntosh Apple Orchards. 54

STREAMS
A Practical Stream Gauge Recorder House. 31
Land Use and Trout Streams. 38
The Silt Load of Texas Streams, 1948-1949, Progress Report No. 11. 43

STREPTOMYCES
Some Effects of Streptomyces Albus and Penicillium Spp. on Rhizobium Meliloti. 57

STUBBLE MULCH
Stubble Mulch Studies: III. Influences of Soil Microorganisms and Crop Residues on the Germination, Growth and Direction of

Page

Root Growth of Corn Seedlings. 57
SUGAR BEETS
The Effects of Moisture, Spacing Fertility and Their Interrelations on Sugar Beet Production. 43
SUMAC
Tannin Content and Other Characteristics of Native Sumac in Relation to Its Value as a Commercial Source of Tannin. 7

TAMARISK
Southwestern Trees and Shrubs - Tamarisk or Saltcedar. 35
Tamarisk - Friend or Foe. 24
TAXATION
Soil Survey - A firm Footing for Fair Taxes. 21
Soil Survey Data as a Basis for the Assessment of Irrigation District Lands. 64
TEACHINGS
Basic Teachings of Jordan Plots Easily Translated into Useful Farm Practice. 25
TEETH
Our Teeth and Our Soil. 7
TERRACING
Terracing - A Profitable Venture. 1
The Development and Study of the Channel-Type Terrace. 13
TILLAGE
Application of the Double-Cut Plow Principle to Mulch Tillage. 35
Principles of Soil Physics in Relation to Tillage. 26
Some Results of Mulch Tillage for Corn. 35
TILTH
Tilth of Corn-Belt Soils Cannot be Maintained without Legumes and Grasses. 15
TOBACCO
Copper in Tobacco Production. 22
TOMATOES
Effect of Fruit Setting Treatment, Variety and Solar Radiation on Yield and Fruit Size of Greenhouse Tomatoes. 6
Effect of Irrigation on the Yield of Snap beans, Sweet Corn, and Tomatoes as Influenced by Certain Cultural Practices in 1949. 17
TRAP
Tucumcari Tumbleweed Trap. 28
TREES
Chemical Control of Undesirable Southern Hardwood. 11
Growth of Trembling Aspen in Relation to Ground Water and Soil Organic Matter. 65
Southwestern Trees and Shrubs - Mescalbean. 9
Southwestern Trees and Shrubs - Gray Oak. 30
Southwestern Trees and Shrubs - Tamarisk or Saltcedar. 35
The Dawson Planting Tool. 62
TUNG OIL
Suitability of Various Soils for Tung Production. 36

VEGETATION
Establishment of Vegetation on Depleted Subalpine Range as Influenced by Microenvironment. 46
Getting Better Records of Vegetation Changes with the Line Interception Method. 46
VOLUME WEIGHT
Tractor Use Effects on Volume Weight of Davidson Loam. 2

WATER
A Direct Method of Computing and Correcting the Equivalent Depth of Water in a Soil Column. 22
Controlling Water on the Land. 10
Fluid Resistance of Composite Roughness. 40
Holding Water in Farm Ponds. 42
Induced Snow Drifting for Water Storage. 9
Measuring Water in Irrigation Channels with Parshall Flumes and Small Weirs. 20
Quality of Water in the Sevier Changes From Upper to Lower Basins. 41
Seepage into Ditches in the Case of a Plane Water Table and an Impervious Substratum. 24
Some Effects of Salt Water on Soil Fertility. 61
Taming Runaway Waters. 15
The Application of the Profit-Water Curve to Irrigation Projects. 26
The Influences of Forest Lands Upon the Water Resources in the Missouri Basin. 9
The Use of Radioistopes for the Measurement of the Water Equivalent of Snow Pack. 24
WEED CONTROL
Chemical Weed Control. 49
Chemicals used in Weed Killing. 15
Controlling Weeds in Corn with 2,4-D. 15
Control of Crabgrass (Digitaria Spp.) by the Use of Chemical Sprays. 17
Controlling Cattail with 2,4-D. 18
Don't Take Weeds for Granted. 34
IPC Controls Quackgrass, Grassy Weeds. 20
Row Crop Weed Control with a Shielded Boom. 18
Slide Rule for Waterweed Control. 3
Turf Culture. 49
Weed Control and Corn Yields in 1949. 3
WILDLIFE
Forest Wildlife Management in the Rocky Mountain Region. 23
Quail Studies on a River Flood Plain. 38
WIND EROSION
Aerodynamics of Wind Erosion. 22
Control of Soil Drifting on Canada's Prairies. 8
Properties of Soil Which Influence Wind Erosion: II. Dry Aggregate Structure as an Index of Erodibility. 21
The Intensity-Frequency of Kansas Winds. 7

FUNDAMENTALS IN CONSERVATION RESEARCH.

By M. L. Nichols; Agr. Eng., Vol. 31, No. 3, pp. 123-124. March 1950.

Two broad classes of basic information must be developed before more efficient conservation practices can be developed, accurately evaluated, and applied to the land. The first class is knowledge of the forms of mainfestation, natural distribution intensity, frequency of occurrence, etc., of the natural forces and resistences to be dealt with, as well as the range of variation within which each can be manipulated. The second class of information deals with the analysis and evaluation of the effects and interactions of forces and resistences. These supply the basis on which conservation measures are developed and evaluated. They also furnish the criteria upon which conservation practices must be adjusted and fitted to meet the specific requirements of local climatic, soil, and vegetative conditions.

An attempt has been made to catalogue the main factors involved in a general way as forces and resistances entering into soil conservation research.

- - - - - - - - - -

SEALING FARM PONDS.

By H. N. Holtan; Agr. Eng., Vol. 31, No. 3, pp. 125-130, and 133-134. March 1950.

A new concept in pond construction is needed for those areas unsuited to the core-wall types of pond. The "bag"-type construction is adapted to areas of limited soil mantle and areas where no reliable subsurface tight layer can be found.

The laboratory work indicates the applicability of soil manipulation principles to sealing pond bottoms. It should be kept in mind that percolation varies directly with head of water, inversely with compaction load, and inversily with depth of soil mantle. The greater heads of water need greater thickness of soil mantle to provide physical support and maximum compaction can be obtained only while the soil is at optium moisture. Soils approaching the limits of "clay bonding" are best suited for sealing by compaction, the use of chemicals for dispersing soils has limited application and bentonites should not be applied without a thorough investigation of conditions.

- - - - - - - - - -

SOIL EROSION CONTROLLERS FOR GRATED IRRIGATION PIPE.

By R. T. Tribble; Agr. Eng., Vol. 31, No. 3, pp. 136-138. March 1950.

The author describes an energy dissipater or erosion controller used with grated irrigation pipe. The device is made of 24-gage galvanized sheet metal shaped to baffle the jet, thus reducing the velocity of discharge before the water enters the furrow. The device is independent of the pipe line, simple to construct, and inexpensive.

- - - - - - - - - -

TERRACING - A PROFITABLE VENTURE.

By H. O. Anderson and P. E. McNall; USDA and Wis. Agr. Exp. Sta., Mimeo. March 1950.

The authors present cost figures for constructing terraces by use of the patrol grader, whirlwind plow and farm tractor and plow.

- - - - - - - - - -

FIRST-YEAR EFFECTS OF LOGGING ON FORAGE PRODUCTION.

By George A. Garrison and Robert S. Rummell; Pacific Northwest Forest and Range Exp. Sta., Research Notes No. 62. February 15, 1950.

This report is primarily concerned with the immediate physical effects of logging on range forage production in the Pacific Northwest ponderosa pine forest ranges. By the first year after logging, the amount of understory vegetation available for grazing had been reduced at least 30 percent by such logging disturbances as soil denudation and slash coverage. Furthermore, the valuable forage grasses were subjected to the major losses. This resulted in serious reductions in quality of forage.

Region-wide, the total losses in forage production for any one year are not very great. To the individual range unit or grazing allotment, though, the losses may be serious. Frequently, all or most of an allotment is logged over within a few months.

Watershed values were not intended to be a phase of this investigation; however, they are strongly implicated in the findings. Exposure of raw soil on 22 percent of a timber sale is likely to accelerate soil erosion and rapid runoff. Rate of runoff should be increased by the packed soils of skid trails and spur roads.

A practical solution to these range and watershed problems on areas logged according to present day methods includes a number of measures. Mechanical spreading of concentrated drainage, temporary diversion of livestock from currently logged forest ranges, and reseeding the denuded areas to good grasses all will assist very effectively in range and watershed rehabilitation following logging disturbance.

- - - - - - - - - -

HERD PERFORMANCE ON KENTUCKY 31 FESCUE.

By A. D. Pratt and J. L. Haynes; Ohio Agr. Exp. Sta., Farm and Home Research, Vol. 35, No. 262, pp. 10-11. January-February 1950.

Tests were made during the past grazing season to evaluate Kentucky 31 fescue in terms of actual animal performance. Both dairy heifers and milk cows grazed the fescue in comparison with improved bluegrass pastures, legume mixtures, pastures, and barn feeding. In all grazing periods during which the heifers were on Kentucky 31 pasture, gains in weight averaged about one-sixth of that made on the other pastures. The calculated yields of T.D.N. obtained daily from Kentucky 31 pasture were about one-third of those from other pastures.

These tests showed unusually poor animal performance on this grass for pasture. Results indicate that the replacement of locally proven pasture grasses by Kentucky 31 would severely penalize animal performance.

- - - - - - - - - -

TALL MEADOW FESCUE IN OHIO.

By L. E. Thatcher, D. R. Dodd and C. J. Willard; Ohio Agr. Exp. Sta., Farm and Home Research, Vol. 35, No. 262, pp. 13-14. January-February 1950.

Ohio and Pennsylvania trials show that Kentucky 31 and Alta Fescue are not as palatable and will not produce as much milk or livestock gains as the more desirable pasture grasses. Palatability varied with succulence and maturity as determined by closeness of grazing or clipping and the season of the year; palatability seems to be higher with the advent of cooler weather in the fall. Alta and Kentucky 31 hay are coarse and unpalatable.

- - - - - - - - - -

A PREPLANTING FOREST SOIL SURVEY.

By Robert F. Tarrant; Jour. of Forestry, Vol. 48, No. 2, pp. 104-105. February 1950.

A simple yet informative method of soil-site survey is described and offered as one answer to the problem of determining area priorities for artificial reforestation on denuded lands.

- - - - - - - - - -

HOW GRAZING CAPACITY OF MOUNTAIN RANGE LANDS IS AFFECTED BY RANGE CONDITION AND USABILITY.

By T. Dean Phinney; Jour. of Forestry, Vol. 48, No. 2, pp. 106-107. February 1950.

A method of range allotment analyses is described which should provide a more accurate and realistic appraisal of grazing capacities than any previous analysis made for conditions where applicable. Data obtained on range condition and trend, together with the range usability classification, should provide a sound basis for management and administration of the range resources.

- - - - - - - - - -

INFLUENCE OF SEASONAL AND CULTURAL CONDITIONS ON AGGREGATION OF HAGERSTOWN SOIL.

By R. B. Alderfer; Soil Sci., Vol. 69, No. 3, pp. 193-203. March 1950.

Structural studies of two types of Hagerstown surface soil over a 4-year period show that seasonal and cultural conditions are capable of exerting a very pronounced influence on the percentage of soil aggregated into particles $>$ 0.25 mm.

Soil moisture content during the growing season had a marked effect on the water-stable aggregation in soil of these types. The duration and the manner of freezing and the moisture content of the soil also affect aggregation during winter, although this effect was found to be very temporary. Seasonal conditions caused a variation in the aggregation of this soil under all types of treatment. Significant treatment differences in aggregation persisted throughout the year, irrespective of the actual amount of soil aggregated under a particular treatment at any given sampling period. After 5 years in Kentucky bluegrass sod, water-stable aggregation in the soil was very markedly increased. Within a 65-year period, the greatest rate of improvement in aggregation occurred during the first 5 years in Kentucky bluegrass sod. Fertilization and manuring in a 4-year rotation containing 1 year of sod effected greater aggregation than that in the soil without such treatment.

- - - - - - - - - -

TRACTOR USE EFFECTS ON VOLUME WEIGHT OF DAVIDSON LOAM.

By H. A. Weaver; Agr. Eng., Vol. 31, No. 4, pp. 182-183. April 1950.

Laboratory results indicate a probability that maximum compaction in Davidson loam from tractor usage occurs somewhere in the range of 11.0 to 15.0 percent moisture content. Bin tests show that annual tractor use in iteelf is capable of compacting that soil to a depth of 9 inches, or below the reach of normal loosening operations, when moisture content is near the optimum for plowing. Hence, the farm tractor may be regarded as a potential contributing factor in the formation of subsurface hard pans.

- - - - - - - - - -

METERING DRY FERTILIZERS AND SOIL AMENDMENTS INTO IRRIGATION SYSTEMS.

By F. S. Fullmer; Better Crops with Plant Food, Vol. 34, No. 3, pp. 8-14 and 40. March 1950.

The author describes and illustrates two types of machines used for the water application of dry fertilizers and soil amendments. One type can, under many conditions, be operated entirely by the irrigation water; while the other type is partially, or wholly, dependent upon power from other sources.

- - - - - - - - - -

SLIDE RULE FOR WATERWEED CONTROL.

By Jesse M. Hodgson; The Reclamation Era, Vol. 36, No. 4, p. 81. April 1950.

The author explains how a convenient, inexpensive, and accurate computor for calculating the concentrations and dosages in application of aromatic solvents for control of waterweeds can be made easily by attaching the necessary scales to an ordinary slide rule.

- - - - - - - - - -

WEED CONTROL AND CORN YIELDS IN 1949.

By Collins Veatch; West Va. Agr. Exp. Sta., Mimeo. Cir. 63. February 1950.

Weed control experiments were conducted on corn in 1949 on Wheeling fine sandy loam and Monongahela fine sandy loam. Chemicals were applied as pre-emergence and post-emergence sprays. Early pre-emergence spray applications were made the day following corn planting and late applications were applied five days later. Post-emergence sprays were applied when the corn was about 18 inches high.

Pre-emergence applications of 2,4-D effectively controlled broad-leaved weeds and annual grasses and gave satisfactory production on Wheeling fine sandy loam, but decreased it on Monongahela fine sandy loam. The decreased yield on the Monongahela fine sandy loam can be attributed primarily to a reduction in stand resulting from a heavy rain, which fell two days following application of the late emergence spray. Post-emergence spray was effective in controlling broad-leaved weeds but did not control annual grasses.

- - - - - - - - - -

SOME EFFECTS OF HERBICIDES ON PASTURE AND ON GRAZING LIVESTOCK.

By B. H. Grigsby and E. D. Farwell; Mich. Agr. Exp. Sta. Quarterly Bul., Vol. 32, No. 3, pp. 378-385. February 1950.

The experiments reported were undertaken in an attempt to determine whether stock injury would follow spray applications which might be used on farm pastures and whether stock showed an preference for sprayed forage. Results indicate that none of the herbicides used had any serious physiological effect upon the livestock involved. They also indicate that none of the livestock preferred any of the sprayed areas to those that were unsprayed; however, with the lots sprayed with 2,4-D, the livestock grazed the sprayed areas almost as well as the unsprayed.

- - - - - - - - - -

GRASSLAND FARMING.

By C. B. Bender; Amer. Plant Food Jour., Vol. 4, No. 1, pp. 2-5. January-February-March 1950.

Grassland crops are the most important sources of feed nutrients on dairy and beef farms. They also play an important role on other types of farms. To the dairyman and beef breeder, pasture, grass silage, and hay furnish the cheapest feed nutrients. Grassland crops in all types of farming furnish, (1) land cover to prevent wind and water erosion, and (2) organic matter to increase the water-holding capacity of the soil, improve the physical character of the soil, and increase soil fertility.

- - - - - - - - - -

THE VIRGINIA PASTURE PROGRAM.

By H. L. Dunton and P. H. DeHart; Amer. Plant Food Jour., Vol. 4, No. 1, pp. 6-8. January-February-March 1950.

The greatest opportunity for increasing the agricultural wealth of Virginia is through a pasture and livestock program that will make more efficient use of the land and labor. Land which had not been returning taxes returned over $100 per acre in income each year through livestock after

being converted into pasture.

In the old established livestock areas where bluegrass and white-clover pastures have been king, more rapid strides in pasture improvement were made through a lime and phosphate program. It is now realized that this program alone will still leave their farms operating at about "one-fourth to one-half throttle" when compared with what they could do by supplementing the bluegrass pasture with orchard grass and ladino-clover pastures and heavier fertilization of all pastures, with either complete fertilizer or one containing both phosphorus and potash.

- - - - - - - - - -

GRASS HOLDS OUR FUTURE.

By D. R. Dodd; Amer. Plant Food Jour., Vol. 4, No. 1, pp. 10-13. January-February-March 1950.

Our best soils were formed under grass sod. And our depleted soils are most rapidly rebuilt and soils are most effectively conserved where good sods are maintained. From grass the farmer obtains his most essential and most economical livestock feed. To grasses he is indebted for more than half of his livestock feed and at a cost of only one-third or one-fourth of what the other half costs. Without grass, crop yields would decline, the soil would lose its structure and wash away or become hard and cease to function as soil. Floods would increase. Food supplies would diminish and civilization would perish.

- - - - - - - - - -

IRRIGATED PASTURES IN CALIFORNIA.

By M. L. Peterson; Amer. Plant Food Jour., Vol. 4, No. 1, pp. 14-17. January-February-March 1950.

Average carrying capacities of irrigated pastures in the Sacramento Valley are about 10 animal unit months of grazing per acre. An animal unit month is considered to be 400 pounds of total digestible nutrients, or the amount of feed required in a month for a mature cow, producing 200 pounds of butterfat per year. Production records from San Bernardino County in southern California ranged from 8.0 to 30.6 animal unit months per acre, in records obtained several years ago. Good pasture under good management at the Experiment Station at Davis produced 16 animal unit months of grazing per acre over approximately an eight-month grazing season. This production is equivalent to 6.4 tons of alfalfa hay per acre. Average gains per acre from lambs or beef cattle in the Sacramento Valley may range between 400 to 500 pounds per acre under farm conditions.

- - - - - - - - -

HOT ASPHALT USED TO SEAL LEAKS IN ROZA CANAL.

By H. W. Pease; The Yakima Daily Replublic, Yakima, Washington. March 9, 1950. The Asphalt Institute News Letter, Vol. 2, No. 4, April 1950, Cobb-Stebbins Building, 1250 Stout St., Denver 4, Colorado.

The author explains how hot asphalt was used in sealing leaks in a section of Roza canal 1,000 feet long, 12 feet wide with 17 foot slopes. The "undersealing" method was used. The sealing was accomplished by pumping special hot asphalt under concrete where the asphalt spreads in all directions, filling the voids and cracks beneath the slab.

The canal was lined with cement in 1937 and first used in 1941. The underseal section of the canal was constructed through a volcanic bassalt formation which was badly cracked and shattered. At the time the concrete lining was placed a cushion course of fines about 1 foot thick was placed over the shattered basalt to provide a base on which to lay the concrete. During the 9 years the canal had been in operation, water had seeped through the numerous cracks in the concrete lining to such an extent that a great deal of the cushion course of fines had washed away.

Holes were drilled through the concrete lining on about 6 foot centers, and tests made for existing voids. A semi-fluid mixture of soil and cement was poured into large holes in the lining at several locations in order to reduce the amount of asphalt required.

The asphalt was forced under the concrete by pumping from a distributor through the holes drilled in the lining until a slight upward movement of the concrete was noted.

- - - - - - - - -

POLLINATION - AN AGRICULTURAL PRACTICE.

By Roy A. Grout; Dadant and Sons, Hamilton, Illinois. 1950.

The author discusses and illustrates the importance of honey bees in connection with the production of legume seed crops.

- - - - - - - - -

SOIL AND WATER LOSSES REDUCED BY IMPROVED FERTILITY.

By Dwight D. Smith; USDA-SCS, Soil Conservation, Vol. 15, No. 11, pp. 254-257. June 1950.

Soil fertility has a very significant effect on runoff and soil erosion. Soils in a high state of fertility produce better and bigger crops,

which means better vegetal covers to protect against damages of raindrop splash. Vegetation is the most effective medium to resist the erosive force of the rainfall. Improving the fertility of the land results in the production of better vegetal covers. Fertilized soils produced bigger crops and permitted less runoff and soil loss than similar soils unfertilized.

- - - - - - - -

AIRPLANE SEEDING OF SAND LOVEGRASS.

By A. J. Longley and M. D. Atkins; USDA-SCS, Soil Conservation, Vol. 15, No. 11, pp. 258-260. June 1950.

Experiences with sand lovegrass on the dunes of southwestern Kansas indicate that the airplane offers a solution to the problem of revegetating land that, to all practical purposes, can't be seeded to adapted grasses any other way. It promises a way to substitute better forage plants for the present stand of sagebrush and weedy grasses on this land where present grazing capacity is low.

Results from seeding by airplane are less satisfactory than from seeding with a drill, but they are encouraging. Some fair stands of sand lovegrass have been obtained by seeding by airplane and seeding costs have been low enough to make revegetation practical.

- - - - - - - -

PERMEABILITY STUDIES ON SOME ILLINOIS SOILS.

By C. A. Van Doren and A. A. Klingebiel; USDA-SCS, Ill. Agr. Exp. Sta., Mimeo. April 1950.

This paper is a preliminary report on permeability, pore space, and volume weight of some Illinois soils. A few typical soil types have been selected in each of four major soil areas in the State. Some data are also reported on the effects of treatment and use of the soil on permeability.

Core samples were collected in cylinders 3 inches in diameter and 3 inches in height. These samples were tested in the laboratory for permeability rate, percent of pores drained, and volume weight.

Surface samples from plots receiving soil treatment, including limestone, rock phosphate, and potash, had higher permeability rates and higher percentage of pores drained than untreated plots.

Permeability of surface soil samples from bluegrass and bluestem sod was at least 10 times greater than samples from cultivated areas. Percent of pores drained was twice as great from the grass sod as from cultivated land. Volume weights of surface soil were considerably less under grass than on cultivated fields.

- - - - - - - -

NUTRITION VIA SOIL FERTILITY ACCORDING TO THE CLIMATIC PATTERN.

By W. A. Albrecht; Paper presented at the British Commonwealth Scientific Official Conference, Special Conference in Agriculture - Melbourne, Australia. May 1949.

The human species seems to be slow in learning how to feed itself effectively. Its nutrition is not guided wholly by instinct, as is true of most lower animals, nor yet by design, sufficiently reliable to guarantee its survival. Degenerative diseases, as causes of death, have risen from 39 percent of the population in the decade 1920-29 to 60 percent in the year 1948. During the same period the infectious and general diseases decreased from 41 to 17 percent.

Disease is so generally associated with positive agents -- the parasite, the toxin, the materies morbi -- that the thought of the pathologist turns naturally to such positive associations and seems to believe with difficulty in causation prefixed by a minus sign.

We are slow to believe (a) that the entrance into the body by microbes is not necessarily by their overwhelming attack but probably their initiatory part of a task of disposal under the beginnings of death recognized earlier by them than by their pseudo-victim; (b) that much of what we call disease is nutritional deficiency; (c) that we do not retain in our foods and feeds all their nutritional values possible between their production and their consumption; (d) that the soil may be deficient in the contribution of the 14 or more indispensable inorganic elements; and (e) that the foods cannot have in them those essential inorganic elements absent in the soil growing them. Man's place at the top of the biotic pyramid may be impressive through its loftiness; but it is correspondingly hazardous in nutrition and thereby in survival in terms of the myriads of compounds and their chemical complexity because of man's dependence on the many services of collection and synthesis coming from below him through the animals, the plants, the microbes and finally the soil fertility. The soil is the point at which the assembly lines of all life take off.

- - - - - - - -

FOR INSURANCE AGAINST DROUGHT SOIL AND WATER CONSERVATION.

By Tom Dale; USDA Farmers' Bulletin No. 2002. March 1950.

Every year some farmers and stockmen in the United States lose money because of drought. The loss is not confined to any one section. The Corn Belt, Cotton Belt, Wheat Belt, western range, and general-farming sections all are damaged by drought at times. Drought may damage crops even on irrigated land and on fields that normally require drainage.

Most areas that have droughts some seasons get more water than is needed during other seasons. Then excess runoff, soil erosion, and floods damage the crops and land. Obviously, some method is needed whereby the wet periods can be balanced against dry periods.

Thousands of farmers and ranchers in this country have found that a well-planned soil and water conservation program helped them prevent damage from drought. This bulletin points out some of the ways this may be done. The conservation practices it advocates have proved successful in all sections of the country to which they are adapted - in every type of climate and on most kinds of land. Thousands of successful farmers recommend these conservation measures for effective drought relief. Properly applied, they are your best insurance against drought.

- - - - - - - -

EFFECT OF FRUIT SETTING TREATMENT, VARIETY AND SOLAR RADIATION ON YIELD AND FRUIT SIZE OF GREENHOUSE TOMATOES.

By S. H. Wittwer; Proc. of the Amer. Soc. for Horticultural Sci., Vol. 53. 1949.

The author reports the effects of commercial vibration practices, used alone and in combination with normal sprays as aids for improving fruit set and size on several of the leading greenhouse tomato varieties, grown both as spring and fall crops during 1947. In all seven varieties grown in the spring, significant differences were obtained in fruit size, while only American forcing types gave significant yield increases. The nine varieties grown in the fall showed significant yield response to first setting treatments but showed no significant differences in fruit size. The significance of varietal and seasonal responses as they relate to the changing day-to-day pattern of solar radiation is discussed.

- - - - - - - -

DRAINAGE FOR SUGARCANE LAND.

By Irwin L. Saveson; The Sugar Bulletin, Vol. 28, No. 13, pp. 198-200 and 202. New Orleans, La. April 1, 1950.

"Turtlebacking" or grading sugar cane land cuts to a crown increased sugar cane yields an average of 5.84 tons of cane and 1,267 pounds of sugar per acre, on 105.6 acres of test areas. The test areas include plant and first year stubble cane, varieties CP 34-12, 29-120, 36-105, and 36-13 on sandy, mixed, and black land. One exceptional test area consisting of 47.2 acres of CP 36-13, averaged 52.49 tons of plant cane per acre and 38.74 tons of first year stubble cane. This is an average yield of 45.61 tons per acre for the two crops. The plantations acreage of sugar cane, 1,231 acres per year for two years, averaged 25.42 tons per acre. The maximum yields were obtained with 13 inches of crown per hundred feet.

- - - - - - - -

RENOVATING WISCONSIN'S BLUEGRASS PASTURE.

By Orville E. Hays, Clyde E. Bay, and Henry L. Ahlgren; USDA-SCS and Wis. Agr. Exp. Sta., Multi. 1950.

Renovated bluegrass pastures produced more than three times as much dry forage per acre as corresponding pastures not renovated. The forage produced on the renovated pasture contained 17.9 percent protein, compared with 14.9 percent for that produced on the pasture not renovated. Heavily grazed renovated pasture produced 2.6 tons of forage per acre as compared with 3 tons per acre for similar areas of renovated pasture which were moderately grazed.

- - - - - - - -

1948 PROGRESS REPORT AND REVIEW OF RESULTS.

By B. H. Hendrickson; Ga. Agr. Exp. Sta., Watkinsville, Ga., Multi. March 1949.

The nature of the runoff and erosion process is now much better known than it was 20 years ago. Progress has been made in evaluating the effectiveness of such permanent covers as forest and grasslands. Terrace design has been fairly well worked out. The limitations of terracing, contour culture, and strip cropping as single erosion-control methods are known. But insufficient progress has yet been made on major conservation problems of crop and soil management which are involved in the use of every field of sloping cropland.

The cropland use situation calls for a considerable change in customary farm-cropping practices, in order to provide an adequate degree of soil protection and maintain profitable yields. More protective vegetative covers are essential, especially for the spring and summer months. Better utilization should be made of crop residues, as they aid in lessening the soil and water losses during the periods when growing crops do not supply adequate protection.

Rotation principles applicable to Class III land

have been emphasized in this report, for the reason that more farmers in the Southeast make more of their living on this class of land, than any other.

- - - - - - - -

TENTH YEAR PROGRESS REPORT FIELD TESTS OF FARM WOODLAND PRACTICES TREE PLANTING STUDIES.

By B. H. Hendrickson and J. A. Gibbs; Ga. Agr. Exp. Sta., Watkinsville, Ga., Multi. January 1950.

These test plots during a period of ten years of growth and development, bring out no great difference in the survival of trees in the treated and check plots. Nor has the survival percent changed much in the pine plots, both treated and checks, since the end of the first growing season. Aside from the hardwood plots on alluvial soil, there is no striking difference discernible as the result of applying the various types of site treatment and methods of planting. Quality of site, species, and density of stand have much more to do in early establishment of ground cover to conserve water and soil than site preparation. The completely mulched plots obviously are an exception.

- - - - - - - -

OUR TEETH AND OUR SOILS.

By Wm. A. Albrecht; Annals of Dentistry, Vol. 6, No. 4, December 1947, Mo. Agr. Exp. Sta. Cir. 333, December 1948.

The knowledge about the human body and its many functions has been accumulating seemingly very slowly. The additions to our information have awaited the coming of each new science and the contributions by them in their respective fields. Dentistry as well as the medical profession has been ready and quick to accept and use any new knowledge that might alleviate human suffering.

Very probably the twentieth century will be credited with the addition of the science of nutrition as a major contribution to the better life of our people. Better nutrition is leading us to think less about medicine as cures and less about fighting microbes with drugs. In a more positive way it is helping us to think more about helping the body defend itself by being well-fed and therefore healthy.

For such defense, the science of the soil and its fertility, by which alone high quality foods can be provided, may well be a present century addition to our knowledge of the better functions and better health of our bodies. It is proposed therefore in this discussion to lead you to think about the health condition of only one part of our body, namely, our teeth as they are related to the fertility of our soils.

- - - - - - - -

TANNIN CONTENT AND OTHER CHARACTERISTICS OF NATIVE SUMAC IN RELATION TO ITS VALUE AS A COMMERCIAL SOURCE OF TANNIN.

By Ira D. Clarke, J. S. Rogers, A. F. Sievers and Henry Hopp; USDA Tech. Bul. No. 986. December 1949.

Eight species of sumac (Rhus) that grow wild in the eastern and southern parts of the United States were studied to determine their tannin contents and abundance. A brief description of each species is given, including the geographic range in which it grows and the range in which collection of certain species for commercial use might be profitable.

The data indicate that Rhus copallina, R. glabra, and R. typhina are most promising for commercial development and that R. trilobata might prove of value under certain circumstances. The remaining four species, R. aromatica, R. lanceolata, R. microphylla, and R. virens, have objectionable features that would probably prevent their successful competition with the other four species.

- - - - - - - -

STREAMBANK EROSION CONTROL ON THE WINOOSKI RIVER, VERMONT.

By Frank C. Edminster, Walter S. Atkinson and Arthur C. McIntyre; USDA Cir. No. 837. October 1949.

This circular gives the case history of streambank erosion control and flood-plain protection project on the Winooski River, Vermont. Like scores of other streams in the Northeast, the Winooski has cut away its banks. It has overrun its channel. It has taken short cuts or meanders across farm fields. It has staged destructive floods. The authors give an account of the measures used to curb the destructive erosion of this stream. These included vegetative and mechanical measures, separately and in combination. Both successful and unsuccessful efforts are described. Finally, those measures and structures that proved most successful in checking erosion and flood damage are briefly summarized.

- - - - - - - -

THE INTENSITY-FREQUENCY OF KANSAS WINDS.

By A. W. Zingg; USDA, SCS-TP-88. April 1950.

The wind velocities experienced during the month of April at several locations in the central

Great plains region are analyzed by a simplified Gumbel method. The records from 12 anemometers were included in the study.

The results of frequency studies for specific locations and gages are shown in graphic form. These data were generalized into time-dimensionless intensity-frequency curves. Estimates were thus developed for heights averaging 65 feet above the ground for time periods varying from 5 minutes to 30 days. They were also developed from time periods varying from 1 hour to 30 days for a 2-foot height above the ground.

- - - - - - - -

SNOW SURVEYS AND IRRIGATION WATER FORECASTS FOR COLUMBIA BASIN.

By Wayne D. Criddle, Morlan W. Nelson and Sterling Davis; USDA, Div. of Irrigation, March 1, 1950.

The March first water supply outlook for this ooming summer in Columbia Basin is still generally good to excellent. Only on the Owyhee River drainage in Nevada and eastern Oregon, with a snow pack about 25 percent below normal, is much deficiency in runoff expected. The western portion of the Basin along the Cascade Mountains is well above normal. Most of the central and eastern portion has a snow pack slightly above average. The Kootenai, Spokane, and Flathead Rivers in northern Idaho and western Montana show a relatively heavy snow cover. The upper Columbia River drainage in British Columbia has slightly above normal snow pack. The main stem of the Columbia River is expected to flow somewhat above the average for the past ten years; but unusually high runoff, because of snow cover, is not at this time anticipated.

- - - - - - - -

DEVELOPMENT FARMS ON RECLAMATION PROJECTS.

By John L. Toevs; USDI, Bu. of Reclamation, Multi. January 1950.

The author presents the methods used in three regions of the Bureau of Reclamation in developing and operating the development farms and points out the strong points of each method.

- - - - - - - -

BIRDSFOOT TREFOIL - A PROMISING FORAGE PLANT.

By A. R. Midgley; Better Crops with Plant Food, Vol. 34, No. 4, pp. 6-11 and 46-47. April 1950.

The author describes birdsfoot Trefoil and discusses its use.

- - - - - - - -

KNOW YOUR SOIL - II. EVESBORO LOAMY FINE SAND - III. SASSAFRAS SAND.

By J. B. Hester, F. A. Shelton and R. L. Isaac, Jr.; Better Crops with Plant Food, Vol. 34, No. 4, pp. 20-21 and 43. April 1950.

The authors report the results of a study made of three soil profiles located within one mile of each other to ascertain information about the relative soil conditions that made possible wide differences in crop yields despite the fact the crops had been treated the same on each of the three soil types. Delanco soil produced 102 bushels of corn, 15 tons of tomatoes and 78 bushels of oats per acre. Evesboro loamy fine sand produced 11.48 tons of tomatoes and sassafras sandy loam produced only 3.97 tons per acre. The results of this study are presented and analyzed.

- - - - - - - -

YEAR-ROUND GREEN.

By R. Y. Bailey; Better Crops with Plant Food, Vol. 34, No. 4, pp. 22-25 and 44-46. April 1950.

The author discusses and illustrates how the land in the South can be kept green continuously. Summer legumes and grasses in combination with annual reseeding winter legumes and grasses furnish the key. This double cropping system keeps the land fully protected and gives a long season of grazing for livestock.

- - - - - - - -

WILL THIS SOIL DRAIN?

By C. H. M. van Bavel; What's New in Crops and Soils, Vol. 2, No. 7, pp. 10-11. April-May 1950.

The author describes a method which anyone may use to determine the permeability of the soil, which will serve as a guide to tell whether or not a soil can be drained and, if so, how well it will drain.

A hole is dug four feet deep with an 8-inch posthole digger in soil which has the water within 12 inches or less from the surface in the spring. As soon as the water rises to its normal water table height in the hole pump or dip it out as rapidly as possible. Before removing the water from the hole place a peg exactly 1 foot below the surface of the water. Observe the length of time necessary for the water to rise to the marker. The permeability of the soil can then be read from a prepared table.

- - - - - - - -

CONTROL OF SOIL DRIFTING ON CANADA'S PRAIRIES.

By P. J. Janzen; What's New in Crops and Soils,

Vol. 2, No. 7, pp. 12-14. April-May 1950.

"Trash-cover farming" proved to be one of the most successful practices in preventing soil drifting. Methods aimed at the control of soil drifting must be modified to meet the needs of the particular type of soil involved. Sandy soils are most hazardous and should be planted to grass permanently wherever possible. Clay soils drift readily but can be protected by leaving all stubble well anchored at the surface of the ground. Loam soils are least subject to drifting but the damage resulting from drifting is the most serious with this type of soil. If drifting is to be prevented on these soils they must be kept covered with trash or with clods.

- - - - - - - -

BAND SEEDING GIVES BETTER LEGUME STANDS.

By J. L. Haynes and L. E. Thatcher; What's New in Crops and Soils, Vol. 2, No. 7, pp. 15-17. April-May 1950.

The "band method" of seeding pastures in Ohio gives the best stands of legumes. Fertilizer is applied at the time the plants are seeded. Both the fertilizer and seed are placed in bands.

- - - - - - - -

ALTA FESCUE FOR HIGH-YIELDING PASTURES.

By H. H. Rampton; What's New in Crops and Soils, Vol. 2, No. 7, pp. 18-19 and 25. April-May 1950.

The author discusses the importance of Alta Fescue as a pasture crop in Oregon.

- - - - - - - -

INDUCED SNOW DRIFTING FOR WATER STORAGE.

By H. W. Lull and H. K. Orr; Jour. of Forestry, Vol. 48, No. 3, Part I, pp. 179-181. April-May 1950.

The authors present the results of preliminary investigations on natural and artificial drifting of snow, together with suggestions as to how induced drifting may improve the usefulness of runoff.

- - - - - - - -

THE INFLUENCES OF FOREST LANDS UPON THE WATER RESOURCES IN THE MISSOURI BASIN.

By J. K. Brandeberry; Jour. of Forestry, Vol. 48, No. 3, Part I, pp. 197-200. April-May 1950.

The author points out the contributions from the forest lands to the availability and usability of water, the measures which should be taken to increase the beneficial contributions and a justification for such a program in the Missouri Basin.

- - - - - - - -

SOUTHWESTERN TREES AND SHRUBS - MESCALBEAN.

By B. W. Allred; Sheep and Goat Raiser, Vol. 30, No. 8, pp. 8-9. May 1950.

The author describes mescalbean and briefly discusses its economic and conservation value.

- - - - - - - -

ADAPTATION OF GRASSES TO SOIL AND WATER CONSERVATION AT HIGH ALTITUDES.

By R. H. Stark, A. L. Hafenrichter, and W. A. Moss; Agron. Jour., Vol. 42, No. 3, pp. 124-127. March 1950.

The results reported in this paper deal with adaptation and organic matter production by grass on very fine sandy soil at high altitudes in eastern Idaho. The soil is subject to severe water and wind erosion when cultivated in a wheat-fallow system. Eleven grass species, representing five use groups, were tested on land that had been farmed for approximately 26 years. The wheat-fallow system of farming previously used had caused 50 percent reduction in the soil organic matter.

Within 6 years big bluegrass, pubescent wheatgrass, smooth bromegrass, Fairway crested wheatgrass, and intermediate wheatgrass restored soil organic matter to levels that were not significantly different from the organic matter content of the virgin soil.

- - - - - - - -

NUTRIENT COMPETION IN PLANT ASSOCIATIONS.

By R. E. Blaser and N. C. Brady; Agron. Jour., Vol. 42, No. 3, pp. 128-130. March 1950.

Studies were conducted to ascertain the effects of nitrogen and potassium on the productivity and botanical and chemical composition of Ladino clover and nonlegumes when grown in a mixture.

Potassium fertilization stimulated the growth of Ladino clover, but did not directly affect the productivity of the nonleguminous plants in the association. The potassium content of all species in the mixture was increased as the potash application was increased. The chemical composition of the species differed, the grasses being higher in potassium content than the legumes and the weeds higher than the grasses.

Nitrogen fertilizers increased the growth of grasses and decreased growth of the leguminous plants in a mixed association. As the growth of grasses was increased by nitrogen fertilization the amount of potassium removed by the grasses was increased. Hence, the concurrent and/or after-effect of nitrogen on reducing the leguminous associate was attributed to competition for potassium.

- - - - - - - -

SEASONAL OCCURRENCE OF RUNOFF AND EROSION FROM A SANDY SOIL IN VEGETABLE PRODUCTION.

By G. D. Brill and O. R. Neal; Agron. Jour., Vol. 42, No. 4, pp. 192-195. April 1950.

A study of rainfall intensity as related to runoff and erosion shows that in central New Jersey the critical period of erosion hazard is during the summer and early fall with a peak in July. A comparatively few high-intensity storms have caused most of the soil and water losses during the period under study.

A winter cover crop is effective in reducing runoff and erosion both during the winter and after it has been plowed under. The actual saving of soil and water brought about by the winter cover is considerably greater during the cultivated season than during the winter period.

The canopy provided by cultivated crops is effective in reducing runoff and erosion. Removal of such crops increases the erosion hazards.

- - - - - - - -

ECOLOGICAL BASES FOR LAND USE PLANNING IN GULF COAST MARSHLANDS.

By Phillip F. Allen; Jour. of Soil and Water Conservation, Vol. 5, No. 2, pp. 57-62 and 85. April 1950.

The author discusses the "dynamic point of view" as applied to conservation. He clearly illustrates the fact that a knowledge of the existing condition of the land is not enough for the land manager, who must also know the process or developmental trend the existing condition represents. This principle is of primary importance to all technicians dealing with native vegetation, whether marsh, range or forest. The article is a first-rate example of the kind of interpretative analysis, based on an intimate knowledge of field condition, that is required if the best use of wild lands is to be achieved. It illustrates also the kind of contribution the biologist can make to land management.

- - - - - - - -

SPLASH EROSION IN PICTURES.

By W. D. Ellison, Jour. of Soil and Water Conservation, Vol. 5, No. 2, pp. 71-73. April 1950.

When land is managed in such a way that permits high-velocity raindrops to strike bare soils, the splash erosion process becomes active. The first product of this splash is mud and in no case will a soil absorb mud as freely as it absorbs clear water. Most soils are practically "waterproofed" by the intake of only very small amounts of muddy surface water. Often the same soils would take in hundreds of thousands of gallons of clear water per acre, and yield much of the intake to ground water, to stream flow, and to the seepage that goes into reservoirs. The article is illustrated with 17 photographs showing the splashing action of the falling raindrop.

- - - - - - - -

CONTROLLING WATER ON THE LAND.

By E. N. Munns and Leon Lassen; Jour. of Soil and Water Conservation, Vol. 5, No. 2, pp. 74-76 and 93. April 1950.

Water conservation is a problem of major concern and involves a number of factors that are often overlooked or are not too well understood. The authors discuss a number of the more important soil-water relations and how they affect runoff. They also point out some of the ways of increasing the storage capacity of the soil mantle, such as the effective depth of the soil as affected by roots, increasing the incorporated organic matter content of the soil material and by actually increasing the soil depth.

- - - - - - - -

DRAINAGE IN CONSERVATION FARMING.

By T. W. Edminster, J. P. Walker, and J. H. Lillard; Jour. of Soil and Water Conservation, Vol. 5, No. 2, pp. 77-79. April 1950.

The authors feel that the urgency of action together with the impediment of technical complexity makes essential the design of new tools to aid the engineer in efficient and effective drainage design. They point out that soil conservationists should encourage and support not only the application of drainage on agricultural lands, but also support the research necessary to speed up and develop a sound economical program of drainage in conservation farming.

- - - - - - - -

INFLUENCE OF EARTHWORMS ON SOIL MICROORGANISMS.

By Gordon M. Day; Soil Sci. Vol. 69, No. 3, pp. 175-184. March 1950.

The study reported in this paper was conducted with the view of determining the changes in soil microflora which may take place in the digestive tract of earthworms. It was concluded that the intestines of earthworms are not necessarily a breeding place for bacteria and that such nitrification as occurs in earthworm excreta is due to the environment of the castings rather than to any increase in nitrifying bacteria within the worms.

- - - - - - - -

1949 ANNUAL REPORT, MOEN DEMONSTRATION FARM, FROID, MONTANA.

By Torlief S. Aasheim; USDA, SCS, Froid, Montana, Mimeo. 1950.

The author gives a brief summary of the accomplishments on the Moen Demonstration farm during 1949.

- - - - - - - -

FIELD METHODS USED TO DEMONSTRATE RANGE CONSERVATION.

By Horace L. Leithead; Jour. of Range Mgt., Vol. 3, No. 2, pp. 95-99. April 1950.

Certain combinations of plants largely determine range condition for any range site. It is only when a range is managed in such a way as to build up plant vigor and to return organic matter to the soil that we can expect the combination of plants known as climax vegetation, or range in excellent condition, to be come established.

The author discusses a simple procedure that might be used to determine the effect of range condition on some of the major factors involved in range conservation.

- - - - - - - -

EFFECTS OF DIFFERENT INTENSITIES OF GRAZING ON DEPTH AND QUALITY OF ROOTS OF GRASSES.

By J. E. Weaver; Jour. of Range Mgt., Vol. 3, No. 2, pp. 100-113. April 1950.

The author presents a new quantitative method of studying root-soil relations and particularly of the effects on the underground plant parts brought about by grazing. A modification of the direct or trench method is used to obtain a sample of the entire root system from the soil surface to the deepest root tips. It consists of the digging of a trench to the desired depth in a particular soil and obtaining of a single soil block (monolith) extending from the surface to a depth of 3 to 6 feet. The monolith is of such dimensions, 2.5 feet wide and 3 inches thick, that it can be removed from the trench and taken to the laboratory without special equipment. The monolith is worked out on the vertical trench wall directly beneath a representative bunch or sod of grass to be studied. With appropriate knives and spades the soil at the sides and beneath the monolith is removed to such a distance into the wall that the column of soil protrudes at least 3 inches into the trench. The monolith is lightly incased in a special open box or frame before it is cut from the trench wall and taken to the laboratory.

The amount and distribution of roots were found to be influenced by the condition of range and pasture grasses as related to the intensity of grazing. The vigor of the grasses deteriorated with an increase in the intensity of grazing. Dry weight of tops produced by weakened plants was 32 to 84 percent less than that of plants which had good to fair vigor. New roots were always shorter and less branched, and dry weight was 28 to 94 percent less than that of vigorous plants of the same species. Just as the forage yield may be increased by good pasture management, so too the root systems of the grasses will be improved somewhat in proportion. A good top that produces much nutritious forage and a good root system that can withstand drought and store much food for early growth in the spring go hand in hand. A depleted range of nonvigorous grasses is usually also one in which the root systems are absorbing water and nutrients only in the upper portion of the soil.

- - - - - - - -

RANGE CONDITION AND SOIL SITE CLASSIFICATION BY HELICOPTER.

By John Chohlis and Fred Scholts; Jour. of Range Mgt., Vol. 3, No. 2, pp. 114-117. April 1950.

The authors used a helicopter in mapping a 110,000-acre project prior to making a land management plan for the area. With certain limitations and qualifications the authors believe the use of a helicopter will speed up the job of gathering the basic resource information needed to plan and establish conservation programs on large areas of range.

- - - - - - - -

CHEMICAL CONTROL OF UNDESIRABLE SOUTHERN HARDWOODS.

By R. S. Campbell and Fred A. Peevy; Jour. of Range Mgt., Vol. 3, No. 2, pp. 118-124. April 1950.

Four methods of chemical application were found useful in tree-poisoning operations on southern upland weed type hardwoods. They are:

1. Applying concentrated chemicals in cups or

notches chopped in the base of the tree trunk.

2. Chemical solution in frills at convenient chopping height.

3. Cutting tree and applying concentrated chemical to outer sapwood of stump top.

4. Spraying chemical on sprouts, brush and small trees.

Cost data show that frilling is the cheapest method, but usually results in too many vigorous basal sprouts. The cup and ammate crystal method is most expensive, but results in the least basal sprouting. Ammate solution in frills costs about the same as two-hack girdling, and is more effective.

- - - - - - - -

MANAGEMENT OF RESEEDED RANGES.

By Waldo R. Frandsen; Jour. of Range Mgt., Vol. 3, No. 2, pp. 125-129. April 1950.

New range seedings should be protected from all grazing until the young plants have developed roots to anchor themselves and effectively resist the pulling effects of grazing. They should not be grazed too early, too late or too long during the season once they have been subjected to grazing.

The author presents a method of management for new seedings which he feels will produce best results.

- - - - - - - -

RELATION BETWEEN SOIL CHARACTERISTICS AND SITE INDEX OF LOBLOLLY PINE IN THE COASTAL PLAIN REGION OF VIRGINIA AND THE CAROLINAS.

By Richard N. Gaiser; Jour. of Forestry, Vol. 48, No. 4, pp. 271-275. April 1950.

The author describes a method for estimating the site quality of loblolly pine lands of the southeastern coastal plain region in terms of the permanent features of the soil profile. Site index curves are similar in shape for all classes of topography, but the mean site index is higher on land of poorer surface drainage than land of better surface drainage. Physical soil characteristics of the depth to impermeable subsoil horizons and the imbibitional water value of the least permeable subsoil horizon affect the growth of loblolly pine. The effect of these soil characteristics on site quality are quantitatively described. One equation describes the regression of site index upon the depth to the least permeable subsoil horizon and the imbibitional water value of that horizon for soils of good or imperfect surface drainage. A similar equation, varying from this one by a constant, describes site quality for those poorly drained soils having plastic subsoils. A third equation, varying in form from the others, describes site index in terms of the depth to the least permeable horizon for those poorly drained soils having friable subsoils. A practical method for applying these results in forest management is outlined.

- - - - - - - -

FIVE YEARS OF SUSTAINED-YIELD OPERATION.

By A. M. Williams, Jr.; Jour. of Forestry, Vol. 48, No. 4, pp. 269-271. April 1950.

The author discusses the results of the first 5 years of a sustained-yield management program on a 49,000 acre tract of cut-over and burned-over forest land. Today a sustained-yield operation is being maintained. In 1942 the company operating the tract employed 80 men, had an annual payroll of about $100,000, and processed some seven million board feet of pine lumber, which sold for an average price of $35.00 per thousand. Today the company provides employment for 130 men and has an annual payroll of approximately $200,000. It now produces only 4.5 million board feet annually; but through more complete processing, it has increased its average sale price to $95.00 per thousand.

- - - - - - - -

SIXTH ANNUAL REPORT, SOIL CONSERVATION EXPERIMENTAL FARM, PAGE COUNTY, IOWA, 1949.

By F. W. Schaller; Iowa Agr. Exp. Sta. Ser., FSR-4. March 1950.

This is the sixth annual report of the studies being conducted on the experimental farm in Page County, Iowa. The studies include the effect of different cropping systems on runoff, soil loss, crop yields, and organic matter content of soil, crop rotations and tillage investigations. In addition to the results for 1949 the average annual results for the period 1943-49, inclusive are also given.

- - - - - - - -

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SLICK-SPOT SOILS.

By Horace J. Harper and Orville E. Stout; Okla. Agr. Exp. Sta. Manuscript Report No. 2. September 1949.

The authors present data on the physical and chemical characteristics of slick-spot soils as compared with adjacent areas of soil having a normal appearance. The purpose was to find

variations between slick-spots and normal soils which might suggest a method of treatment for improving the productivity of the slick-spot areas. Most of these spots are only a few feet in diameter, although some may occupy several acres. They occur more frequently on upland than on bottom land. They are frequently observed on freshly plowed land in central and eastern Oklahoma following a period of heavy rainfall. On sloping areas of cultivated land, much of the surface soil has been removed from the slick-spots by erosion, and they present a yellow appearance.

- - - - - - - -

LIST OF REFERENCES TO BORON LITERATURE-REVIEWED JANUARY-MARCH 1948.

By Library Amer. Potash Institute, Inc., 1155 Sixteenth Street, N. W. Washington, D. C. Mimeo B-45. March 30, 1950.

This is a list of publications on boron published during the years 1946, 1947 and 1948 arranged by states for the United States and by Provinces for Canada.

- - - - - - - -

RECENT DEVELOPMENTS IN THE CHEMICAL CONTROL OF BRUSH ON TEXAS RANGES.

By Vernon A. Young, C. E. Fisher, R. A. Darrow, W. G. McCully and D. W. Young; Tex. Agr. Exp. Sta. Bul. No. 721. March 1950.

This bulletin outlines the progress of experimental work on the chemical control of various types of brush that occur in Texas. These results are based principally on trials conducted from 1947 through 1949. Application rates are suggested, but it is stated that they are subject to modification by further trials.

- - - - - - - -

EFFECT OF BORON ON NITROGEN FIXATION BY AZOTOBACTER.

By J. V. Jordan and G. R. Anderson; Soil Sci., Vol. 69, No. 4, pp. 311-319. April 1950.

The object of this experiment was to investigate the action of boron on A. Chroococcum. Studies were made of the influence of boron on nitrogen fixation by A. Chroococcum in field and greenhouse soils on agar plates. In addition, pure cultures of A. Chroococcum were grown in agar and nutrient broth treated with boric acid at varying rates.

Camas gravelly loam, Chehalis silty clay loam, and Newberg sandy loam soils gave increased nitrogen values over the untreated soils, which contained 0.3 to 0.4 ppm. available boron. These increases amounted to 100 percent or more in the treated soils when the available boron ranged from 0.5 to 1.8 ppm.

- - - - - - - -

THE DEVELOPMENT AND STUDY OF THE CHANNEL-TYPE TERRACE.

By A. J. Wojta; Agr. Eng., Vol. 31, No. 5, pp. 227-229, 231 and 233. May 1950.

This study was conducted to determine the effects of the channel-type terrace system on crop yields, land drainage, and machinery and machinery operations, also the requirements of terrace construction machinery and the costs and maintenance of the terrace system are studied. Results obtained thus far indicate that a dead furrow or single furrow practically destroys the entire terrace capacity; that flat-bottom-shaped terraces, i.e., bottom widths 8.0 feet, side slopes 6 to 1 constructed to depths ranging from 0.5 to 1.0 foot, showed that the change in end area, resulting from all tillage operations for one season, ordinarily needed to produce corn and small grain, was no greater between the terrace depths than within each depth; and that a V-section terrace with 10 to 1 side slopes most nearly approximate the parabolic-shaped section that results from tillage operations over the terrace.

- - - - - - - -

PROGRESS REPORT, 1945-49 - SOUTHEAST OKLAHOMA PASTURE-FERTILITY RESEARCH STATION.

By Horace J. Harper, W. C. Elder, O. B. Ross; Okla. Agr. Exp. Sta. Bul. B-348. May 1950.

Experimental studies to measure the effect of soil treatment on forage and beef production have been conducted since 1945. Abandoned upland prairie soil planted to Bermuda grass, lespedeza and big hop clover has produced an average of 75 pounds of beef per acre annually over a four-year period. Lime applied to this soil increased beef production to 98 pounds per acre. Lime and superphosphate increased beef production to 129 pounds per acre.

Eroded timber soil treated with lime, superphosphate and potash and planted to Bermuda grass, big hop clover and lespedeza produced 113 pounds of beef per acre.

Three-year-old steers gained 3.24 pounds per day for 81 days in the spring of 1949 on big hop clover and Bermuda grass pasture on prairie upland soil that was limed and fertilized with superphosphate, as compared with 2.26 pounds per day on unfertilized pasture. Gains on eroded soil were 2.54 pounds per day on fertilized and

1.67 pounds per day on unfertilized land.

- - - - - - - -

EFFECTS OF THIRTY YEARS OF PROTECTION FROM GRAZING IN DESERT GRASSLAND.

By J. L. Gardner; Ecology, Vol. 31, No. 1, pp. 44-50. January 1950.

The information presented in this paper was gathered on a 320-acre tract of desert grassland situated about 10 miles south of Silver City, New Mexico. Except for the presence of about 40 cattle for a month or two during the spring of 1948, the area has been protected from domestic livestock since 1918.

In 1946, grass density on the upland inside the area was 110 percent higher than that outside; there was little difference, however, in species composition between the two.

Owing to drought in 1947 and 1948, grass density had decreased by 50 percent on a tobosa grass flat in the area in October, 1948, and by 74 percent on the upland both inside and out. Gullies were raw and eroding outside and healing inside. After 30 years of protection, however, none was completely healed; on the otherhand, none was actually eroding.

- - - - - - - -

AGRICULTURAL INSECTICIDES.

By G. S. Hensill; Amer. Fertilizer, Vol. 112, No. 11, pp. 9 and 30. May 27, 1950.

The agricultural insecticide situation has undergone a major change in recent years. Where previously agriculture was concerned with inorganic insecticides, such as lead arsenate and cryolite, and botanical insecticides of plant origin such as rotenone, pyrethrum and nicotine - today, agriculture is concerned with newer organic insecticides which have posed problems of plant tolerances, poison residues and other factors.

The author reports on some of the newer products, such as DDT, lindane, TEPP, parathion, methoxy-DDT and DDD (analogs or close "relatives" of DDT), BHC, Toxaphene and Chlordane.

- - - - - - - -

1949 ANNUAL REPORT FOR THE MIDWEST CLAYPAN SOIL CONSERVATION EXPERIMENT FARM, McCREDIE, MISSOURI.

By Dwight D. Smith, Darnell M. Whitt and Walter H. Wischmeier; USDA-SCS and Mo. Agr. Exp. Sta. Mimeo.

The authors present the results of the studies being conducted at McCredie, Missouri for the year 1949. Annual averages are also given for the entire life of the study where feasible.

- - - - - - - -

MIDWEST CLAYPAN SOIL CONSERVATION EXPERIMENT FARM, McCredie, Missouri.

By D. D. Smith, D. M. Whitt; USDA-SCS and Mo. Agr. Exp. Sta., Mimeo. May 1950.

The authors describe the investigations being conducted at McCredie, Missouri and give a brief summary of results to date.

- - - - - - - -

RESEARCH REPORT NO. 178 - THE EFFECT OF SOIL FUMIGATS AND NITROGEN LEVELS ON EARLY DYING OF POTATOES.

By J. D. Menzies; USDA-BPI and SAE and Wash. Agr. Exp. Sta., Mimeo. March 1, 1950.

It was believed that verticillium wilt was responsible for the unthrifty growth and early maturity of Russet Burbank potatoes in the irrigated areas in the Northwest. Proceeding on this assumption, the author used different chemicals to fumigate the soil and 40, 80 and 160 pounds of nitrogen per acre to determine the proper nitrogen level for maximum potato production.

Chloropicrin used as a soil fumigant effectively controlled verticillium wilt and eliminated the symptoms of early dying in potatoes. Dowfume IV was moderately beneficial but ethylene dibromide was completely ineffective. Plant vigor and yield of tubers was strikingly improved by chloropicrin fumigation.

No significant differences in amount of disease or in total yield were obtained among nitrogen levels of 40, 80 and 160 pounds of nitrogen per acre. In the chloropicrin treated plots satisfactory growth and yield occurred at all nitrogen levels indicating that 40 pounds of nitrogen were adequate.

- - - - - - - -

RESEARCH REPORT NO. 185 - SOIL MANAGEMENT AND IRRIGATION INVESTIGATIONS IN THE COLUMBIA BASIN.

By Carl E. Nelson; USDA-BPI and SAE and Wash. Agr. Exp. Sta., Mimeo. March 31, 1950.

This is a progress report on crop adaptability and varietal trials conducted on the Moses Lake Development Farm, and the Roza Unit of the Irrigation Experiment Station. It includes varietal trials with field corn, grain sorghum and soybeans; adaptation trials with seed flax; and uniform varietal nursery trials with small grain.

- - - - - - - -

EFFECT OF FERTILIZATION AND CULTURAL PRACTICES ON GROWTH AND YIELD OF CONCORD GRAPEVINES.

By H. K. Fleming, R. B. Alderfer and D. E. H. Frear; Pa. Agr. Exp. Sta. Bul. 523. March 1950.

The purpose of this publication is to present the results of the first five years' study of the effects of fertilization and cultural treatments on the growth and yields of concord grapevines on the well-to-moderately well-drained, acid, lake terrace soils of Erie County, Pennsylvania.

Soil fertilization tests showed no increases in vine growth or yield from the annual spring application of nitrogen and potash in amounts greater than 20 and 50 pounds per acre, respectively. The addition of boron, manganese, and zinc at the rate of 10 pounds of borax, 30 pounds of zinc sulfate, and 30 pounds of manganese sulfate per acre every third year, to a 25-year-old vineyard on Ottowa loamy fine sand, produced no measurable changes. Results of other treatments are also discussed.

- - - - - - - - -

TAMING RUNAWAY WATERS.

By C. W. Gee; USDA, Soil Conservation Service, AIS-85. November 1949.

The author describes some of the major damages caused by surface waters flowing over agricultural land and stresses the importance of their control. He also discusses the water retardation phase of the National Flood Control program, as carried on by the U. S. Department of Agriculture.

- - - - - - - - -

CHEMICALS USED IN WEED KILLING.

By L. W. Kephart; USDA, BPI and SAE, Mimeo. January 1950.

The author presents a brief discussion of several of the chemical substances which have the greatest general interest and usefulness as weed killers.

- - - - - - - - -

TILTH OF CORN-BELT SOILS CANNOT BE MAINTAINED WITHOUT LEGUMES AND GRASSES.

By R. S. Stauffer; Ill. Agr. Ext. Cir. 655. April 1950.

Does your soil dry out more slowly after a heavy rain than it used to? Does it stay too wet to be worked several days longer than it should? Either of these conditions is a warning of what is happening to many of our soils that have been growing corn, soybeans, and small grains year after year. Under such treatment even the best corn-belt soils finally reach the point where they drain too slowly and cannot get enough air for high production.

We are concerned here chiefly with the way some of our best corn-belt soils are deteriorating. We cannot afford to let these soils be ruined. The payoff won't start until you translate these words of advice into action right on your farm. There is no point in waiting until the soil begins to go bad before doing something. Start a good program, whatever the present condition of your soil. Above all, Start Now.

- - - - - - - - -

CONTROLLING WEEDS IN CORN WITH 2,4-D.

By F. W. Slife, R. F. Fuelleman, G. E. McKibben, and W. O. Scott; Ill. Agr. Ext. Cir. 652. January 1950.

During 1949 more than 500,000 acres of corn in Illinois were sprayed with 2,4-D for the control of weeds. Other states in the North-Central region are likewise spraying large acreages of corn with 2,4-D. Results have been generally satisfactory but with this wide use have come some disappointments. Many of these unsatisfactory results can be explained by unfavorable climate, wrong soil type, miscalculation of material or sprayer, and too little knowledge of the types of weeds 2,4-D will control.

The purpose of this circular is to give the best available information on how to use 2,4-D so that it will control weeds most effectively without damaging the corn crop. Although 2,4-D is undoubtedly the best chemical aid the farmer has yet had in his fight with weeds, it is not recommended as a complete substitute for cultivation or other cultural practices.

- - - - - - - - -

THE DURATION AND EFFECT OF 2,4-D TOXICITY TO CROPS GROWN ON CALCAREOUS SOIL UNDER CONTROLLED IRRIGATION CONDITIONS.

By Lambert C. Erickson and Harry S. Gault; Agron. Jour., Vol. 42, No. 5, pp. 226-229. May 1950.

The study reported here was designed to determine how long toxicity caused by 2,4-D might persist under the soil and climatic conditions of southern Idaho. The objectives were to determine how long the residual effect of 2,4-D would persist in Portneuf silt loam, how the rate of application might influence the duration of toxicity and how different crops would respond to equal levels of this herbicide in the soil.

Initial toxicity was determined by planting five different crops at intervals of 15, 30 and 45 days following the 2,4-D treatments. The herbicide was applied at the rates of 2 and 4 pounds acid equivalent per acre. Alfalfa, beans, corn, oats, and potatoes were used as indicator crops.

Soil toxicity did not decrease over the 45-day period in the presence of 0.18 inch rainfall but decreased rapidly when the treated areas were irrigated. Alfalfa was found to be the most sensitive crop tested following by beans, oats, corn, and potatoes in decreasing order.

- - - - - - - -

EFFECT OF HEIGHT AND FREQUENCY OF CUTTING ON THE PRODUCTIVITY AND SURVIVAL OF LADINO CLOVER.

By Milo B. Tesar and H. L. Ahlgren; Agron. Jour. Vol. 42, No. 5, pp. 230-235. May 1950.

The effects of two heights and three frequencies of cutting on the productivity and continued survival of Ladino clover grown alone and with smooth bromegrass, timothy or orchard grass, was studied at Madison, Wisconsin, during the period 1946 to 1948. Seedings made in 1946 were cut two, four, and six times at heights of 1 and 3 1/2 inches in 1947 and the residual effect of these six cutting treatments was measured by two uniform cuttings to a height of 1 inch in 1948. Likewise, Ladino clover seeded alone and with timothy bromegrass, or orchard grass in 1947 was harvested two, four, and six times at heights of 1 and 3 1/2 inches in 1948 for yield determinations. The results of these studies are discussed and summarized.

- - - - - - - -

THE EFFECTIVENESS OF MANURE AND COMMERCIAL FERTILIZER IN RESTORING THE PRODUCTIVITY OF SUBSOILS EXPOSED BY LEVELING.

By Robert S. Whitney, Robert Gardner, and D. W. Robertson; Agron. Jour., Vol. 42, No. 5, pp. 239-245. May 1950.

This report presents the results of the comparison between manure and commercial fertilizers for the first 3 years of studies started in 1945 at Fort Collins, Colorado to find methods of restoring the productivity of subsoil exposed by leveling (or erosion).

The major factors involved in limiting the growth on the subsoils studied were a deficiency of available N and P. Both manure and commercial fertilizers were effective in producing practically normal yields of corn, sugarbeets and spring wheat in a very short time. Rather high rates of application were used. The importance of deep placement of phosphate was determined also.

- - - - - - - -

RADIOACTIVE MATERIALS AS PLANT STIMULANTS - FIELD RESULTS.

By Lyle T. Alexander; Agron. Jour., Vol. 42, No. 6, pp. 252-255. May 1950.

This report contains the results of field tests conducted during the 1948 and 1949 crop seasons to determine if radioactive materials stimulate plant growth. The general conclusion is that no effect of the radioactive materials was found, either beneficial or harmful.

- - - - - - - -

RESPONSE OF ALFALFA AND ALFALFA-BROMEGRASS MIXTURE TO VARIOUS CUTTING TREATMENTS.

By Alex Dotzenko and Gilbert H. Ahlgren; Agron. Jour., Vol. 42, No. 5, pp. 246-247. May 1950.

A study was conducted on the effects of different cutting treatments upon the forage yield and root reserves of alfalfa in an alfalfa-bromegrass mixture. Frequent and early cutting treatments reduced the dry weight of the alfalfa roots and the percentage of total polysaccharides found in the roots. A positive correlation of 0.84 was found between the dry weight of roots and the percentage of total polysaccharides found in the roots. It appears that cuttings earlier than at 1/10 bloom markedly reduced the yield of alfalfa in an alfalfa-bromegrass mixture and that this reduction is related to the weight of the roots and the percentage of polysaccharides contained.

- - - - - - - -

SOME FACTORS AFFECTING HUMUS DEVELOPMENT IN THE NORTHEAST.

By Richard S. Sartz and William D. Hutlinger; Jour. of Forestry, Vol. 48, No. 5, pp. 341-344. May 1950.

Some of the important factors affecting the development of forest humus layers in the northeast have been brought to light during the course of flood-control survey investigations being made in the northeast. Evidence has shown that the depth of humus increases with the age of stand until maximum foliage production is reached, and that humus depth is directly correlated with stand density. Although age is largely the expression of total organic matter accumulation, density (which is a measure of the amount of foliage) controls the balance between organic accumulation and decomposition. Logging fire and grazing have destructive effects on humus layers, depending on their intensity and frequency or duration. Evidence was found that

northeast slopes develop deeper humus layers than other aspects and that micro-topographic features caused extreme variations in humus depths. In addition, inconclusive evidence showed that less humus is likely to develop on sandy soils than on heavier-textured soils, other factors being equal.

- - - - - - - -

A METHOD OF FORECASTING ANNUAL VARIATIONS IN SEED CROP FOR LOBLOLLY PINE.

By Kenneth B. Trousdell; Jour. of Forestry, Vol. 48, No. 5, pp. 345-348. May 1950.

This study provides abundant evidence that a prediction of cone crop failures and bumper crops for a forest stand can be made 6 months in advance. The magnitude of any change in total seed production, as estimated by a seed-cone ration, will overestimate unsound seed as production falls and underestimate sound seed as total production rises. The reason is that the bigger the crop, the larger the precent of sound seed and the smaller the crop, the lower the percent of sound seed.

- - - - - - - -

WILL PELLET SEEDING WORK?

By Joe A. Wagner and Clarence P. Kinkor; Amer. Forests, Vol. 56, No. 5, pp. 24, 44 and 45. May 1950.

This is a report on the results obtained by seeding 90,000 acres of Indian reservation-lands in Arizona begun in 1946, by the aerial pellet method. Preliminary conclusions indicate that (1) the results from this operation are directly proportional to the amount of ground preparation, other factors being equal; (2) seeding with unpelletized seed gave approximately the same results as seeding with pelletized seed.

- - - - - - - -

CONTROL OF CRABGRASS (DIGITARIA SPP.) BY THE USE OF CHEMICAL SPRAYS.

By Buford H. Grigsby; Mich. Agr. Exp. Sta. Quarterly Bul, Vol. 32, No. 4, pp. 479-485. May 1950.

During the summer of 1948 series of experiments were started at East Lansing, Michigan and at selected locations in other states, to determine the effectiveness of certain petroleum products in the control of crabgrass. In 1949 comparative studies of petroleum and other chemicals were made at East Lansing.

Selective control of crabgrass can be obtained with a number of chemical sprays. Some injury to perennial grasses may follow heavy applications of certain of these chemicals. A light petroleum fraction is reported as having selective killing action on crabgrass at most stages of growth. This product does not injure most common lawn grasses. Two or more applications of 2-3 quarts of oil per square rod are suggested as the most satisfactory rate.

- - - - - - - -

EFFECT OF IRRIGATION ON THE YIELD OF SNAP BEANS, SWEET CORN AND TOMATOES AS INFLUENCED BY CERTAIN CULTURAL PRACTICES IN 1949.

By R. L. Carolus and Paul E. Schleusener; Mich. Agr. Exp. Sta. Quarterly Bul., Vol. 32, No. 4, pp. 465-478. May 1950.

The relation of various irrigation practices in conjunction with the effects of several other practices or factors on the yield of snap beans, sweet corn and tomatoes was investigated in 1949 and compared with the results obtained in 1948.

In the 1948 crop season, with a rainfall of 76 percent of the average 30-year value, the application of 4 inches of water increased the yields of these crops from 50 to 125 percent. In 1949 with a seasonal rainfall during the crop season totaling 134 percent of the average, the increase in yield for the use of irrigation on the same crops was not significant, ranging from 6 to 12 percent. However, in 1949 when the most productive irrigation practice was combined with higher than normal rates of fertilizer application - even in this wet year - the crop increases ranged from 10 to 20 percent above those of unirrigated comparisons.

In seasons of above-average rainfall, higher rates of fertilization than those normally suggested appear justified. Experimentation in this study with starter-solution-treated tomato transplants indicated that the treatment was significantly effective in improving early yield but not total yield.

- - - - - - - - - .

PHYSICAL SOIL FACTORS GOVERNING CROP GROWTH.

By R. E. Storie and W. W. Weir; Better Crops with Plant Food, Vol. 34, No. 5, pp. 6-10 and 39-41. May 1950.

The authors discuss the various physical characteristics of an all-purpose, highly productive soil that makes it distinctive.

- - - - - - - -

RESEEDING CRIMSON CLOVER ADDS NEW INCOME FOR THE SOUTH.

By J. A. Naftel; Better Crops with Plant Food,

Vol. 34, No. 5, pp. 11-12 and 44-45. May 1950.

Reseeding crimson clover is expected to be a key crop in the changing pattern of southern agriculture. It fits into the year-round grazing program which offers great hope for raising the farm income through better balanced crop-livestock farming.

- - - - - - - -

ALFALFA - ITS MINERAL REQUIREMENTS AND CHEMICAL COMPOSITION.

By Firman E. Bear and Arthur Wallace; Better Crops with Plant Food, Vol. 34, No. 5, pp. 13-18 and 45-47. May 1950.

The authors discuss the mineral requirements of alfalfa and its chemical compositions.

- - - - - - - -

THE PRODUCTION AND UTILIZATION OF PERENNIAL FORAGE IN NORTH GEORGIA.

By O. L. Brooks; Better Crops with Plant Food, Vol. 34, No. 5, pp. 21-23 and 42. May 1950.

The yield records that have been obtained with pasture and forage plants in North Georgia can be more fully appreciated with a brief review of the area as a background. This is especially true of the high production obtained with perennial plants such as ladino clover and tall fescue. The author reviews the subject briefly.

- - - - - - - -

AN ECONOMIC APPRAISAL OF ANHYDROUS AMMONIA AS A NITROGENOUS FERTILIZER.

By James P. Gaines and Grady B. Crowe; Miss. Agr. Exp. Sta., Mimeo. April 1950.

The principal purpose of the study upon which this report is based was to provide information which would help farmers to make an economic appraisal of anhydrous ammonia as a source of nitrogen. A further purpose was to learn the storage and application practices in general use. Practice data are fundamental to the cost analysis.

The findings of the study, although not delineated as such, are presented in this report in five major parts. The first is concerned with the practices observed on farms visited; the second presents the average cost of using anhydrous ammonia on these farms; in the third, ammonia and solid fertilizers are compared; the fourth examines the situation on small farms; and the fifth is a summary of information presented and conclusions drawn. Other pertinent information supplementary to the text is presented in the Appendix.

- - - - - - - -

CONTROLLING CATTAIL WITH 2,4-D.

By Max Wilson and G. M. Finney; The Reclamation Era, Vol. 36, No. 6, pp. 108-109. June 1950.

Based on the results of three years study with the use of 2,4-D in controlling cattail the authors conclude that the plant can be controlled successfully by spraying when the plant is growing vigorously, spraying at regular intervals so regrowth will not get too tall, and spraying thoroughly and preventing drift. Cattail will not be blitzed but, through a planned program, its roots can be so weakened that routine treatment becomes effective and economical.

- - - - - - - -

A REVIEW OF EVAPORATION THEORY AND DEVELOPMENT OF INSTRUMENTATION.

By E. R. Anderson, L. J. Anderson and J. J. Marciano; U. S. Navy Electionics Laboratory, San Diego, California, NE 121215, Report 159, Problem 2jla. February 1950.

The purpose of this report is to review all evaporation equations based on the mass-transfer and energy-budget approaches, and to describe the instrumentation, developed and modified for experimental testing selected equations. The review of existing theory is believed to be complete as of August 1, 1949. As regards the choice of equations, the aim is to test as many as appear to have a reasonable possibility of success, consistent with limitations on manpower and finances.

- - - - - - - -

ROW CROP WEED CONTROL WITH A SHIELDED BOOM.

By J. D. Wilson; Ohio Farm and Home Research, Vol. 35, No. 263, pp. 21-22. March-April 1950.

The author describes a shielded boom which he constructed and used to protect crops from the spray of chemical weed killers being directed at weeds growing between the rows.

The machine was tried out on 12 crops with the chief concentration on corn and soybeans. Most of the plantings were made on muck soil where about 10 species of weeds were present. Sulfasan, P.E.C.,N.I.X., Dow selective, 2,4-D shell weed killer 130, santobrite, fenester, ammate, and aerocyanate were among the herbicidal formulations tested. Such materials as sulfasan and P.E.C. were formulated in several different ways, and nearly all the compounds were used at more than one dilution.

Results of testing the shielded boom suggests that this method of applying sprays should be of practical value in weed control.

- - - - - - - -

T C A - A NEW QUACKGRASS KILLER.

By C. J. Willard; Ohio Farm and Home Research, Vol. 35, No. 263, pp. 24-25. March-April 1950.

A new chemical, trichloroacetic acid (TCA), has been giving satisfactory results in killing quackgrass since the summer of 1947. TCA is the most promising grass killer on the market, but it is too new to give definite, economic rules for its use. This article contains some suggestions for its use and some indication of its limitations.

- - - - - - - -

USING BLUEGRASS ON OHIO FARMS.

By J. L. Haynes, M. A. Bachtel and A. D. Pratt; Ohio Farm and Home Research, Vol. 35, No. 263, pp. 26-27. March-April 1950.

Differences in value of bluegrass pasture for livestock are largely determined by the kind and amount of legume growing in the bluegrass. Based on their legume content, most bluegrass pastures may be described as bluegrass without legume, bluegrass-native white clover, bluegrass-ladino clover, or bluegrass-birdsfoot trefoil.

- - - - - - - -

THE EFFECT OF MILKY DISEASE ON JAPANESE BEETLE POPULATIONS OVER A TEN-YEAR PERIOD.

By R. T. White and P. J. McCabe; USDA-ARA-BEPQ, Washington, D. C. E-801. June 1950.

The milky disease of larvae of the Japanese beetle (Popillia japonica Newm.) is an important factor in the biological control of this insect. This disease is caused by certain soil-inhabiting, spore-forming bacteria, Bacillus popilliae Dutky and B. lentimorbus Dutky, which are exceedingly resistant to temperature and moisture fluctuations. Observations over the large infested area have shown that, when present, the milky disease reduces the beetle population to a low level and prevents substantial increases thereafter. Partly because of the hardiness of these organisms and partly because of the ease with which they may be introduced into new areas, the use of the milky disease has become an important factor in the effort to control the Japanese beetle.

- - - - - - - -

BUTTONCLOVER, ANOTHER OF THE GREAT NEW PLANTS.

By Barrington King; USDA Soil Conservation, Vol. 15, No. 12, pp. 276-277 and 279. July 1950.

Buttonclover is proving to be a valuable soil conserving crop in northern Alabama. Buttonclover lies close to the ground and provides good protection against erosion before the stand gets crowded and starts its upward growth. "It will wait for the seed to be harvested". It has an extremely high percent of hard seed and stands will volunteer for several years after the seed crop is produced.

- - - - - - - -

PROGRESS REPORT, 1950 - SOIL AND WATER CONSERVATION RESEARCH AT THE RED PLAINS CONSERVATION EXPERIMENT STATION, GUTHRIE, OKLAHOMA.

By Harley A. Daniel, Harry M. Elwell and Maurice B. Cox; Okla. Agr. Exp. Sta., Mimeo. Cir. M-195. April 1950.

This report summarizes results of research on cropping systems on terraced and unterraced land, cover crops and fertilizers, methods of establishing and maintaining plant cover, gully control, and pasture and meadow development and management on the 350-acre Red Plains Station at Guthrie, Oklahoma.

- - - - - - - -

PROGRESS REPORT, 1950 - SOIL AND WATER CONSERVATION RESEARCH AT THE WHEATLAND CONSERVATION EXPERIMENT STATION CHEROKEE, OKLAHOMA.

By Harley A. Daniel, Harry M. Elwell and Maurice B. Cox; Okla. Agr. Exp. Sta., Mimeo. Cir. M-196. April 1950.

Research under way on the 320-acre Wheatland station has as its objective discovering and designing means of conserving moisture to reduce the possibility of floods and to increase plant growth. Tillage practices and cropping systems are being studied as possible solutions. Tillage practices are tested on both terraced and unterraced land. This report summarizes results of research on terraces and contour cultivation, tillage methods, fertilization, vegetated waterways, and water spreading.

- - - - - - - -

FERTILIZER EXPERIMENTS AND CROP YIELDS IN JAPAN AND SOME COMPARISONS WITH THOSE IN THE UNITED STATES.

By C. L. W. Swanson; The American Fertilizer, Vol. 112, No. 3, pp. 1-9. February 1950.

The author describes field experiments with fertilizers on the major agricultural crops grown in Japan. Lowland rice, upland rice, wheat, covered barley, naked barley, sweet potato, white potato, Satsuma orange, tea and mulberry are covered. According to data obtained, nitrogen is by far the most important fertilizer nutrient influencing grain yield of both lowland

and upland rice. Phosphorus and potassium also increase yields of these crops, especially upland rice. Nitrogen also exerts the greatest influence on the yields of wheat, covered barley, and naked barley. Potash is the most important fertilizer nutrient required for maximum production of sweet potatoes. Liberal applications of nitrogen, phosphoric acid, and potash are essential for high yields of white potatoes.

Using as a basis of comparison the five-year periods ending 1882 and 1942, production of rice increased 70 percent; wheat, 140 percent; common barley, 119 percent; naked barley, 62 percent; and tea, 180 percent. For a like period in the United States, production for similar crops increased as follows: Wheat, 23.4 percent; barley, 4.4 percent; oats, 16.8 percent; and corn, 19.3 percent.

- - - - - - - -

GARDEN FARMING IN JAPAN.

By C. L. W. Swanson; The Science Counselor, Duquesne Univ. Press, Pittsburgh 19, Pa. March 1950.

The author points out that because of scarcity of land and the density of the population, Japanese farmers are garden farmers. Per acre fertilizer consumption is high. Crop production rates per acre are high but when measured on the basis of production per man hour they are low.

- - - - - - - -

IPC CONTROLS QUACKGRASS, GRASSY WEEDS.

By Sam H. Bailey and Norville R. Gish; Ore. Agr. Exp. Sta. Bul. 477, pp. 31-32. March 1950.

IPC (O-Iso-propyl-N-phenyl carbamate), a highly selective weed killer, shows tremendous promise for control of weedy grasses in a variety of crops. It effectively controls quackgrass and grassy weeds in legume seed crops, vegetable crops, various horticultural crops and orchards, sugar beets and perennial grasses.

- - - - - - - -

WOOD WASTES MAKE VALUABLE SOIL MULCHES.

By Sam H. Bailey and Norville R. Gish; Ore. Agr. Exp. Sta. Bul. 477, pp. 49-50. March 1950.

The value of wood wastes as organic mulches and soil amendments for horticultural crops has been definitely established. Such wood wastes as fir sawdust, if properly used, make a practical mulch without deterimental effects. If sufficient nitrogen-bearing fertilizers are applied with these materials to compensate for the nitrogen used during the decomposition processes there will be no detrimental effects to the crop and at the same time increased production due to improved conditions for plant growth may result.

- - - - - - - -

MEASURING WATER IN IRRIGATION CHANNELS WITH PARSHALL FLUMES AND SMALL WEIRS.

By R. L. Parshall; USDA, SCS Cir. No. 843. May 1950.

This circular describes practical measuring devices for the beneficial and economical use of irrigation supplies. Standard weirs of various types and sizes are discussed. Their advantages and disadvantages, and recommendations for their use are set out. The merits of the Parshall measuring flume are also explained. This device has been perfected in sizes ranging from throat widths of 3 inches, which can accurately measure flows of 0.1 second-foot as a minimum, to that of structures having throat widths of 40 feet with a maximum capacity of more than 2,000 second-feet. Flumes as here described range in size from 3 inches to 8 feet and are limited in capacity to about 100 second-feet.

- - - - - - - -

EFFECT OF MULCHING FALL GROWN POTATOES, YUMA MESA, 1948-1949.

By Charles D. Converse; Yuma Mesa Soil and Crop Laboratory, Yuma, Arizona, Research Report No. 180. March 15, 1950.

Mulching experiments with potatoes on the Yuma Mesa were conducted in 1949 in which mulching and no mulching were the only variable factors. Plantings were made on August 16, September 1, and September 15, 1949. Alfalfa hay was spread over the treated plots to a depth of 2 to 4 inches for the mulch.

The mulch had a conspicuous effect on yield. Visual effects in the field were equally pronounced. Emergence was earlier and more complete, growth more rapid and color better. Yields were nearly 7 times greater from the mulched plots than from those not protected in the first planting, about 4 1/2 times larger for the second planting, and more than twice as high for the last.

- - - - - - - -

IRRIGATED SOILS NEED GOOD MANAGEMENT.

By D. W. Thorne; What's New in Crops and Soils; Vol. 2, No. 8, pp. 9-11. June-July 1950.

When irrigation practices are adjusted to maintain the most favorable soil moisture conditions,

other good management procedures start to pay off, and yields are pyramided. More plants can be grown per acre with plentiful moisture, and fertilizers become more effective too.

- - - - - - - -

COLLECT SOIL PROFILES - A USEFUL HOBBY.

By T. M. Bushnell; What's New in Crops and Soils; Vol. 2, No. 8, pp. 16-17. June-July 1950.

A knowledge of the main soil types is just as important, from the standpoint of farming operations, as the crops grown or the livestock raised. Clay and sand, loam and peat - each has a distinctive character all its own. Each "soil type" or individual kind of soil has several distinctly different layers, or horizons, in the vertical cross section, or soil profile. Therefore, the soil cannot be properly represented by a single specimen or sample, as would be possible with a wild flower or certain types of rocks.

These horizons, which often vary widely from soil to soil, are the main characters by which we identify the different soil types. Frequently, too, they play an important role in how the soil can be used.

The author describes a practical method for representing a soil section by taking small specimens of each soil layer. When these specimens are mounted together - and in proper order on a strip of cardboard, the result is a minature vertical section of the soil as it exists in the field.

- - - - - - - -

SOIL SURVEY - A FIRM FOOTING FOR FAIR TAXES.

By R. Earl Storie; What's New in Crops and Soils, Vol. 2, No. 8, pp. 20-21. June-July 1950.

The author explains how soil surveys can be made a practical basis for determining the productive value of different kinds of land and hence the basis of taxation.

- - - - - - - -

EFFECT OF LONG-TIME CROPPING ON SOIL PROPERTIES IN NORTHEASTERN NEW MEXICO.

By C. W. Chang; Soil Sci., Vol. 69, No. 5, pp. 359-368. May 1950.

Extensive physical measurements, chemical analyses, and biological tests were conducted on approximately 100 samples of soil collected from horizons of cropped and virgin fields of Tucumcari loam, mixed Quay and La Brier loam, Dalhart fine sandy loam, and Springer fine sandy loam. After an average of 22 years under cropping, these soils show a considerable decline in their physical suitability for agricultural purposes and in organic matter, total N, and nutrient-supply ability. Chemical differences between cropped and virgin soils are often inadequate to account for differences in productivity.

- - - - - - - -

MAINTENANCE OF SOIL ORGANIC MATTER: II. LOSSES OF CARBON AND NITROGEN FROM YOUNG AND MATURE PLANT MATERIALS DURING DECOMPOSITION IN SOIL.

By Louis A. Pinck, Franklin E. Allison and Mildred S. Sherman; Soil Sci., Vol. 69, No. 5, pp. 391-401. May 1950.

The primary purpose of this study was to obtain further direct comparisons of the stability, or persistence, of the carbon of green manures with that of mature materials when used as humus sources, and to determine to what extent nitrogen additions made to crop residues of wide carbon-nitrogen ratios tend to hold the carbon from these residues in the soil.

Contrary to popular belief, the carbon of succulent green manure crops was retained by the soil to almost as great a degree as was that of mature plant materials. The main effect of nitrogen additions is to accelerate the process of humus formation and feed the crop, if present.

- - - - - - - -

PROPERTIES OF SOIL WHICH INFLUENCE WIND EROSION: II. DRY AGGREGATE STRUCTURE AS AN INDEX OF ERODIBILITY.

By W. S. Chepil; Soil Sci., Vol. 69, No. 5, pp. 403-414. May 1950.

A simple method of computing the erodibility of cultivated soils by wind is presented. The computed erosion values are based on soils with a smooth surface free from organic residues. After determination of the apparent specific gravity and the proportions of dry soil fractions by sieving, the relative erodibility of any soil reasonably free from organic residues can be readily computed from the tables presented.

- - - - - - - -

DEVELOPMENT OF A DISPENSER FOR APPLYING RADIOACTIVE PHOSPHATE FERTILIZER.

By Glen A. Cumings, Walter C. Hulbert and Dale B. Eldredge; Agr. Eng., Vol. 31, No. 6, pp. 275-277. June 1950.

The authors constructed and describe a hopper which can be used satisfactorily in dispensing radioactive phosphate in ordinary fertilizers

and other materials in good drilling condition.

- - - - - - - -

AERODYNAMICS OF WIND EROSION.

By A.W.Zingg and W. S. Chepil; Agr. Eng., Vol. 31, No. 6, pp. 279-282 and 284. June 1950.

The basic nature of problems common to the dynamic action of fluids on the land surface is cited. Studies of the phenomenon of soil erosion by wind initiated at the Manhattan, Kansas, headquarters are outlined briefly. Experiences with the soil-blowing tunnel are discussed. Some of the aerodynamic characteristics of the wind tunnel developed at the Manhattan laboratory are given.

Formulas which have been applied to the description of surface wind movement are presented. Demonstrated, also, are problems common to the application of these relationships to the phenomenon of wind movement above field surfaces.

The types of soil movement and forms of erosion caused by wind are summarized, and some of the physical characteristics of several soil materials blown about and drifted into small dunes in the spring of 1948 are presented.

- - - - - - - -

A DIRECT METHOD OF COMPUTING AND CORRECTING THE EQUIVALENT DEPTH OF WATER IN A SOIL COLUMN.

By Janes O. Henrie; Agr. Eng., Vol. 31, No. 6, pp. 290-291. June 1950.

The author presents a direct method of computing the equivalent depth of water in a column of soil when sampled with the improved King soil-sampling tube, or any other sampling device that cuts a circular core out of the soil. He also describes a correction to be used with this sampling method to correct for a gain or loss of core. This is a fast and accurate means of computing the inches of water in a soil sample after the actual sampling has been done.

- - - - - - - -

A QUANTITATIVE METHOD FOR DETERMINING GROUND-WATER CHARACTERISTICS FOR DRAINAGE DESIGN.

By John G. Ferris; Agr. Eng., Vol. 31, No. 6, pp. 285-289 and 291. June 1950.

Studies were made to develop rational methods for determining the effect of drains on lake levels and on the regional water table. A drain formula is presented for determining the coefficients of transmissibility and storage which compares favorably with the geologic and hydrologic checks that were available.

- - - - - - - -

STUDIES OF PRESSURE-HEAD LOSSES IN CONCRETE RISERS AND ALFALFA VALUES.

By Verne H. Scott; Agr. Eng., Vol. 31, No. 6, pp. 292-294. June 1950.

The author describes the laboratory setup used and presents the data obtained from a study of losses occurring in risers. It is apparent from these data that the pressure-head loss for discharge rates within the usual range of irrigation practice for the sizes of risers and values tested is not large.

- - - - - - - -

APPRAISING DESERT RANGE FORAGE FOR SHEEP.

By C. Wayne Cook, David O. Williamson, Lorin E. Harris, L. A. Stoddart and L. L. Madsen; Utah Agr. Exp. Sta., Farm and Home Science, Vol. 11, No. 2, pp. 32-33 and 42. June 1950.

Studies indicate that browse plants are of higher quality than grass and that they generally make up a larger part of the diet of sheep. Studies were conducted in the nutritive value of plants on summer and winter range over a period of 3 years. These experiments included a study of the vegetative composition of the range, a determination of which plants make up the diet of grazing sheep, a chemical analysis of these plants to determine nutritive value, and actual feeding trials to see how sheep weight and production of wool and lambs responded to supplementing various feeds and minerals that appear deficient on the range. Phosphorus was found to be deficient in all species at all times. Browse plants contained from 2 to 3 times as much phosphorus as grasses. Phorphorus, like protein, increases in the spring when new growth begins.

- - - - - - - -

GRASS SEED PRODUCTION IN NEBRASKA.

By Laird G. Wolfe and Henry H. Wolfe; Neb. Agr. Ext. Ser. Cir. 188. April 1950.

The authors discuss the planting and care of grass planted for the express purpose of producing seed. Grass seed is a cash crop adopted to both dry-land and irrigated farms. Production can be carried out with ordinary farm equipment, and care and harvesting fit in well with other farm operations.

- - - - - - - -

COPPER IN TOBACCO PRODUCTION.

By T. R. Swanback; Conn. Agr. Exp. Sta. (New Haven), Bul. 535. April 1950.

Three years experiments with copper sulfate applied to Havana seed tobacco at an acre rate of 18 to 20 pounds gave an increase of 13 to more than 26 percent in crop value. This increase in crop value appeared to result from an increased rate of nitrification in the soil and not to assimilation of additional copper by the plant.

- - - - - - - -

MEASUREMENT OF THE PRODUCTIVITY OF SOILS UNDER VARIOUS ENVIRONMENTAL CONDITIONS.

By R. T. Odell; Agron. Jour., Vol. 42, No. 6, pp. 282-292. June 1950.

The purpose of this study was to determine, by objective sampling methods, yields of corn obtained on two dark-colored prairie soils as influenced by weather conditions, depth of surface soil, density of corn stand, rock phosphate applications, crop sequence, and direction of slope.

During 1946 and 1947 corn yields were determined in a series of plots, located in farmer's fields in north central Illinois on Tama silt loam and Swygert silt loam under all conditions studied. Average corn yields were higher where the surface soil (A horizon) was thick than where it was thin. Corn yields increased as the density of stand increased in both soil types.

- - - - - - - -

EFFECT OF SOME PHYSICAL SOIL PROPERTIES ON DOUGLAS-FIR SITE QUALITY.

By Stanley P. Gessel and William J. Lloyd; Jour. of Forestry, Vol. 48, No. 6, pp. 405-410. June 1950.

A forest soil-survey in northwestern Washington during the summer of 1949 indicated that productivity of land for Douglas-fir growth could be predicted from soils information. Site index on all soils examined increased with change in texture from coarse to light to medium. Heavy textured soils were not included in the study. Medium-textured soils of different profile groups did not differ significantly in site index. Depth of soil was an important factor for those soils underlain by a hardpan or by bedrock.

Site index on the same soil profile and texture group was related to mean annual precipitation. Site index on soils increases with increasing precipitation up to 40 inches. Above this amount of rainfall site index decreased for coarse, fine and medium-textured soils. Site index on soils underlain by an impeding layer increased with precipitation up to 60 inches. The greatest increase was up to 40 inches and above this amount the change in site index was small.

- - - - - - - -

RELATIVE CAPACITY OF SOILS TO FURNISH IONS TO PLANTS.

By Walter S. Eisenmenger; Jour. of Forestry, Vol. 48, No. 6, pp. 416-418. June 1950.

This investigation was conducted to learn the relative capacity of some well-known soils of Massachusetts to furnish magnesium, calcium, and phosphorus to species of plants, having different capacities to secure the needed ions for their growth.

The last annual growth of six perennials - ash, birch, hickory, oak, sumac, a grass - and one annual, goldenrod, were collected from each of four soil series. The soils were Dover, Holyoke, Gloucester, and Cheshire which were weathered respectively from limestone, troprock, granite, and triasic sandstone.

The average percentage intake of both calcium and magnesium was highest in the plants grown in the Holyoke series, followed by the plants grown on Dover soil. The lowest average percentage of calcium was found in the plants grown on Gloucester soil and the lowest percentage of magnesium was found in the plants grown on the Cheshire-soil. The order of uptake of calcium and magnesium did not paralled the order of relative abundance of the element in the rocks from which the soils were weathered, nor did the order of exchangeable calcium, and the order of base exchange capacity of the soils.

- - - - - - - -

FOREST WILDLIFE MANAGEMENT IN THE ROCKY MOUNTAIN REGION.

By Ralph R. Hill; Jour. of Forestry, Vol. 48, No. 6, pp. 419-422. June 1950.

This article deals primiarily with the forests and wildlands of the mountain area of Colorado, the eastern slope forests of Wyoming, and the Black Hills of South Dakota. Here, it is presumed, wildlife management is practiced as an integrate part of land management.

- - - - - - - -

RAINFALL INTERCEPTION BY CHAPARRAL IN CALIFORNIA.

By E. L. Hamilton and P. B. Rowe; Calif. Dept. of Nat. Resources. 1949.

The authors present the results of three rainfall interception studies conducted in shruby vegetation native to California. They show that much of the rainfall caught by this vegetation, and generally assumed to be lost by evaporation, actually reaches the ground by flowing down the stems. Equally important for practical application of the results, the studies demonstrated

that the amount of interception loss in this vegetation bears a definite relation to the amount of storm rainfall. Once this relation has been established for a given type of vegetation, the interception loss can be readily determined from rainfall measurements alone. Finally, the studies have provided a picture of the interception process by showing how interception loss develops during typical storms and how the storm rainfall is redistributed by vegetation.

- - - - - - - -

NEW GRASSES FOR THE WESTERN RANGE.

By Anthony Netboy; Amer. Forests, Vol. 56, No. 7, pp. 7-9 and 42-43. July 1950.

Range men are trying out species of forage plants under various climatic and soil conditions to find those which will thrive on the great western ranges where many decades of intensive grazing has sharply reduced the good native grasses and permitted useless invaders to take over. The author discusses some of the successes achieved todate.

- - - - - - - -

TAMARISK - FRIEND OR FOE.

By E. N. Munns; Amer. Forests, Vol. 56, No. 7, pp. 18-19, and 44-45. July 1950.

The beauty of tamarisk is enchanting and it is without an equal as a windbreak. But water users see it only as a blight on the countryside.

- - - - - - - -

INTERCEPTION STORAGE OF RAINFALL BY CORN PLANTS.

By N. L. Stoltenberg and T. V. Wilson; Amer. Geo. Union Trans., Vol. 31, No. 3, pp. 443-448. June 1950.

The processes resulting in interception and interception storage of rainfall by corn plants are discussed and terms defined. Values for two components of interception storage on mature corn plants have been determined under several conditions. The dominant factor affecting the value for residual interception storage on mature corn is the plant population. The amount and rate of rainfall has little effect on residual storage after sufficient rain has fallen to fill the storage pockets. Maximum residual interception storage on mature corn was found to be about 0.02 inch for a corn plant population of 15,000 plants per acre. This amount of storage is smaller than has generally been accepted on the basis of earlier studies.

- - - - - - - -

THE USE OF RADIOISOTOPES FOR THE MEASUREMENT OF THE WATER EQUIVALENT OF SNOW PACK.

By R. W. Gerdel, B. Lyle Hansen, and W. C. Cassidy; Amer. Geo. Union. Trans., Vol. 31, No. 3, pp. 449-453. June 1950.

A radio-telemetering snow gage has been designed which uses the principle of absorption by water (liquid or solid phase) of the gamma emissions from an artificial radioactive isotope. The radioactive, radio-telemetering snow gage has been used successfully to measure up to 55 water equivalent inches of snow by counting the pulses from a suitably located Geiger-Muller tube. These pulses have been successfully transmitted and relayed by radio. Further progress is dependent upon the development of a reliable radio communication system for use with the radioactive snow gage in remote high mountain areas.

- - - - - - - -

USE OF HISTORICAL DATA IN FLOOD-FREQUENCY ANALYSIS.

By Manuel A. Benson; Amer. Geo. Union Trans., Vol. 31, No. 3, pp. 419-424. June 1950.

A flood-frequency study for the Susquehanna River at Harrisburg, Pa., involved the use of both historical and recent flood data. The historical data started in 1786 and covered all flood peaks above a stage of 18.0 feet or approximately 340,000 cfs. The continuous record began in 1874. The use of hitherto available techniques for combining the historical with recent data was found to give inconsistent results. Analysis showed that in plotting points for the purpose of drawing a frequency curve, consistent results could be obtained only if all points were based on the same period of record. It was known that all the missing years of record since 1786 had annual peak floods of less than 340,000 cfs. It was assumed that the same distribution of peak floods below 340,000 cfs occurred during these years as is known to have occurred during those years in the recent period. The method of computation involved an adjusting of order numbers for all items below 340,000 cfs. The result is a consistent set of points and a well-defined frequency curve.

- - - - - - - -

SEEPAGE INTO DITCHES IN THE CASE OF A PLANE WATER TABLE AND AN IMPERVIOUS SUBSTRATUM.

By Don Kirkham; Amer. Geo. Union Trans., Vol. 31, No. 3, pp. 425-430. June 1950.

It is shown how the quantity of water seeping from a plane water table into equally spaced ditches with vertical walls may be computed by

considering the ditch problem as a special case of an auger hole problem, already solved. Streamlines, distribution of hydraulic head, and the seepage rate into unit length of ditch are computed. The computed seepage rate does not account for drawdown of water table around the ditch and therefore represents a maximum value. Applications are discussed and a result compared with the work of NELSON-SKORNIVAKOV (1940).

- - - - - - - -

HYDROLOGIC PROBLEMS CONCERNING THE RUNOFF IN HEADWATER REGIONS.

By B. W. P. Roessel; Amer. Geo. Union Trans., Vol. 31, No. 3, pp. 431-442. June 1950.

In this paper are discussed some of the concepts of watershed hydrology as related to surface, subsurface, and ground-water runoff. Data from Swiss and other watershed studies illustrate that true ground-water discharge may form the major part of flood flows, with minor or no contributions by surface runoff. Results of experiments with sand and troughs to determine the effect of aquifer length are used to explain apparent anomalies in the comparison of the two Emental watersheds. It is postulated that the length of the aquifer is a factor controlling ground-water storage and sensitivity of stream flow to rainfall. In the sand troughs and the Swiss watersheds the same volume of ground-water storage did not always produce the same runoff rate. The explanation is that outflow is controlled by the rate of filling. Short rains of high intensity, even without any surface runoff, will produce crests more pointed than those of rains of longer duration and lower intensity.

- - - - - - - -

BASIC TEACHINGS OF JORDAN PLOTS EASILY TRANSLATED INTO USEFUL FARM PRACTICE.

By A. C. Richer; Sci. for the Farmer, Pa. Agr. Exp. Sta., Supplement No. 3 to Bul. 515; the 62nd Annual Rpt. July 1950.

A few examples of the lessons to be learned from studies conducted on the Jordan plots are: (1) Lime alone, without fertilizers or manure, produces yields no better than where nothing had been applied. (2) Fertilizers alone, on acid soils, give very poor response. Lime can increase the efficiency of fertilizers up to 300 percent as measured by crop response. (3) Phosphorus is the first limiting element of Pennsylvania soils. When used alone or in any combination, it has resulted in a substantial increase in yield. (4) High yields can be maintained indefinitely with inorganic commercial fertilizers. (5) Where manure was applied at 6, 8, and 10 tons per acre, the greatest return per ton of manure was obtained from the lightest application. (6) Reinforcing manure with superphosphate is a sound and profitable farm practice.

- - - - - - - -

FRIEND OR ENEMY?

By E. H. Bakken; The Lone Scout, Vol. 24, No. 5, p. 4. May 1950.

Driven by the enormous force of gravity and with the speed of rifle bullets, raindrops bombard the fortress of the earth. Every raindrop which hits the bare soil splashes bits of it away. A violent rainstorm may move more than a hundred tons of soil per acre. On rolling ground this soil erodes in much the same way that snow drifts across the surface with the wind. Thus the raindrops may be our mortal enemy, carrying away our rich topsoil in which food is grown and through which life is preserved. The first important step in the conservation of soil and water, and the protection of fish and wildlife, is the control of splash erosion. The soil must be kept covered and protected at all times if this damage is to be avoided.

- - - - - - - -

LEGUMES AND GRASSES — NEEDS, COSTS, PROBLEMS, AND BENEFITS.

By E. L. Sauer; Ill. Agr. Exp. Sta., AE-2740. Mimeo. May 16, 1950.

A sound long-time land-use program for Illinois as a whole would suggest an average of no more than 40 percent of the cropland in corn and soybeans and at least 35 percent in rotation hay and pasture. A good soil improvement program will result in additional hay and pasture. To utilize the hay and pasture, the number of roughage-consuming livestock may have to be increased. Farmers with the most legumes and grasses have had higher livestock efficiency as measured by returns per $100 of feed fed.

- - - - - - - -

STUDIES ON THE PERSISTENCE AND MOVEMENT OF SODIUM TRICHLOROACETATE IN THE SOIL.

By A. J. Loustalot and R. Ferrer; Agron. Jour., Vol. 42, No. 7, pp. 323-327. July 1950.

This study was carried out to determine the effect of temperature, soil moisture, and texture on the persistence and movement of sodium trichloroacetate (TCA) in the soil.

The persistence of the toxicity of TCA was affected by the temperature, soil moisture and texture. High temperature, soil moisture and

coarse soil texture decreased the period of effectiveness of TCA.

- - - - - - - -

A STUDY OF SAMPLING METHODS USED IN DETERMINING THE PRODUCTIVITY OF ILLINOIS SOILS.

By R. T. Odell; Agron. Jour., Vol. 42, No. 7, pp. 328-335. July 1950.

The author attempted to determine the most efficient sampling methods for estimating corn yields on small plots located in farmer's fields. It was found that increasing the number of hills sampled per plot (up to 40) increased the accuracy of estimated plot means and, therefore, also increased the accuracy of estimates of treatment-group means. Much greater increases in accuracy of estimating the treatment-group means may be obtained by increasing the number of plots sampled per treatment-group. For a given sampling intensity, or total number of hills sampled per treatment-group, closer estimates of the treatment-group means may be obtained by sampling fewer P. S. U's (randon vs. systematic selection of hills within a primary sampling unit) (n) (number of P. S. U's sampled) per plot, and more plots (n) (number of plots sampled) per treatment-group.

- - - - - - - -

PRINCIPLES OF SOIL PHYSICS IN RELATION TO TILLAGE.

By G. M. Browning; Agr. Eng., Vol. 31, No. 7, pp. 341-344. July 1950.

The author discusses a number of factors he considers essential to maintaining good soil structure.

- - - - - - - -

THE APPLICATION OF THE PROFIT-WATER CURVE TO IRRIGATION PROJECTS.

By Hitoshi Fukuda; Agr. Eng., Vol. 31, No. 7, pp. 350-352. July 1950.

In this paper treating the combination of many irrigable crops on a given land, the irrigable area and required amount of water for each crop from the most economical standpoint, taken on the whole, were discussed and determined. The case with limited water supply was always considered by using the profit-water curve which was to be obtained experimentally.

- - - - - - - -

AN INVESTIGATION OF EVAPORATION FROM IRRIGATION SPRAYS.

By John R. Mather; Agr. Eng., Vol. 31, No. 7, pp. 345-348. July 1950.

The author presents data in the form of dew-point temperatures both to the windward and leeward of irrigation spray. Use was made of these data in the calculation of evaporation from the irrigation spray and the moist soil and vegetation surface.

Two somewhat similar methods of computation give values for evaporation from the spray and moist soil of from 4 to 30 percent of the water applied. The actual observations and evaporation computations suggest that from a water conservation point of view:

1. The application of water by irrigation should occur as rapidly and in as large quantities as is economically possible to prevent undue evaporation.

2. The size of the irrigated area should be large to take advantage of the fact that less water is evaporated into the air as the size of the irrigated area increases.

- - - - - - - -

HYDRAULIC MODEL STUDIES FOR WHITING FIELD NAVAL AIR STATION.

By Fred W. Blaisdell and Charles A. Donnelly; USDA-SCS and Minn. Agr. Exp. Sta., St. Anthony Falls Laboratory, Project Report No. 23. January 1950.

The authors designed an entirely new system to convey the water down the sides of the plateau at the Whiting field naval air field near Milton, Florida. Parts of the proposed drainage system involved new and untried methods of handling the flow, and these designs were developed by means of hydraulic models. Other structures involved designs on which it was felt that model tests were expedient.

The model studies are reported in five parts. Each part covers one general type of structure. Parts I to IV, covering studies on a straight spillway, a cantilevered ditch outlet, pipe-ditch transition structures and a detention-type box-inlet drop spillway, are presented.

- - - - - - - -

MORE ABOUT RAINDROP SPLASH EROSION.

By Johathan Forman; The Land News, Series 10, No. 2, p. 13, 1368 N. High St., Columbus 1, Ohio. June 1950.

There is a great deal of difference between mud conservation and soil and water conservation. Mud is a mixture of water and soil in which the soil has lost its structure, while wet soil retains its structure and is filled with pores and

capillaries and other channels which pull clear water into the soil as fast as it comes into contact with the ground.

Splash erosion on bare, unprotected soil produces a liquid mud which is often mistakenly referred to as surface water. It also produces a compacted surface mud through which this liquid must flow to enter the soil.

By commonly accepted standards there may be no difference between mud and wet soil. But for the soil and water conservationist there must be a difference. The mud formula is soil plus water plus destructive energy equals mud. Now, the "water-plus destructive energy" is rainfall. So, the wet soil formula is soil plus rainfall, minus destructive energy equals wet soil.

Mud is the inevitable result where splash erosion is active. The function of the soil cover is to remove the energy from the rainfall factor so as to check splash erosion and get started at the beginning on the job of conservation. The difference is one of great import. If the mud formula is in effect on the land, then one is at best a mud conservationist. The mud conservationist accepts the principle of a million little dams and he tries to hold the mud on the hillsides with dams. Under these circumstances he measures the degree of his success or failure in terms of mud that goes down the river. But if the wet soil formula operates on our fields, then we maintain a porous soil up to the very surface, and as the clear rainfall is delivered to the soil it comes under capillary tension that is somewhat uniform from the beginning to the end of a storm, and instead of trying to store all the water on the surface, behind contours, imitating the deeds of the Tank Kings of Ceylon, we utilize the great underground reservoir for water storage.

Checking the operation of the mud formula is the primary consideration in a soil and water conservation program. This means checking splash erosion which represents the beginning of conservation. If we miss this we ultimately fail all down the line.

- - - - - - - -

A PIEZOMETER METHOD OF MEASURING SOIL PERMEABILITY AND APPLICATION OF PERMEABILITY DATA TO A DRAINAGE PROBLEM.

By James Nichols Luthin; Iowa State College, Jour. of Sci., Vol. 24, No. 1, pp. 79-80. October 1949.

A field method of measuring the soil permeability beneath a water table was developed. Pipes of small diameter (called piezometers) were driven into the soil below the watertable, the soil was augered out of the piezometer and the rate of inflow of the water from the soil into the piezometer was measured. The permeability of the soil was then calculated by means of a suitable equation.

- - - - - - - -

A NEW DIAGRAM FOR THE TEXTURAL CLASSIFICATION OF SOILS.

By B. E. Beater; The Jour. of Soil Sci., Vol. 1, No. 2, pp. 163-172. January 1950.

Reference is made to the undesirability of discarding material which does not pass a 2-mm. round-hole sieve previous to mechanical analyses. It is recommended, also, that there should be a revision to the former lower limit of 1 mm. for gravel and an adjustment to 10 mm. for the upper limit of this material, which should be reported separately and inclusive of the coarse-sand fraction.

A new diagram is presented for the textural classification of soils and employs all four international fractions in assessing the textural class, gravel also being taken into consideration.

It is claimed that while the submitted diagram is not founded entirely on field estimates of texture, as in the case of the triangular system, it provides a truer and more detailed representation of the textural class, to which field estimates must be adjusted in the laboratory.

- - - - - - - -

THE EQUILIBRIUM OF RAIN-FED GROUND-WATER RESTING ON DEEPER SALINE WATER: THE GHYBEN-HERZBERG LENS.

By E. C. Childs; The Jour. of Soil Sci., Vol. 1, No. 2, pp. 173-181. January 1950.

When precipitated fresh water falls on the land already occupied by sea-fed salt-ground-water, there is a dynamic equilibrium with fresh ground-water perched upon the salt ground-water. The configuration is known as the Ghyben-Herzberg lens. In this paper potential functions are set up for the separate ground-water bodies and the boundary conditions are elucidated. By means of electric analogues certain particular and idealized cases are completely solved, all being steady states, although the procedure for non-steady states is indicated. The cases solved are for different sea-levels on the two opposite sides of an idealized dyke, and for the same sea level on the two sides but for five different rates of rainfall, in each case the configuration of all boundaries and also the flow nets being presented.

- - - - - - - -

THE INFLUENCE OF HUMUS ON SOIL AGGREGATION.

By R. J. Swaby; The Jour. of Soil Sci., Vol. 1, No. 2, pp. 182-194. January 1950.

The author examines the possibility of colloidal humus constituents acting as soil cements. He advises the use of caution in interpreting the results. Besides showing the effect of modifying polar groups on aggregation, it is possible that they show also the effect of partially degrading the protein and polyzonide molecules, although only fairly mild chemical methods were used. It seems likely, however, that NH_2 COOH, and OH groups might all be involved in polar linkages between organic and inorganic colloids.

Evidently most of the micro-organisms caused destruction of the sterilized Ca humate cement without producing much hyphae or gums, so that the disaggregating influences outweighed the aggregating effects. In natural soils containing almost permanent crumbs either the humus is not so readily digested by micro-organisms or the humate films are reformed almost immedicately.

- - - - - - - -

THE INFLUENCE OF EARTHWORMS ON SOIL AGGREGATION.

By R. J. Swaby; The Jour. of Soil Sci., Vol. 1, No. 2, pp. 195-197. January 1950.

The author attempted to determine the mechanism whereby earthworms improve soil structure. It was concluded that earthworms only improve the structure of soils well supplied with organic matter. An abundant food supply increases the number of intestinal bacteria, some of which produce gums and glue the casts into stable aggregates. Under the conditions of restricted areation inside the earthworm fungi do not flourish. This mechanism for increasing the stability of worm casts differs from that produced directly in soil by the incorporation of readily decomposable material, where the effect of fungi mycelium is more important than that of slime-producing bacteria.

- - - - - - - -

SOME OBSERVATIONS ON THE OXIDATION OF SOIL ORGANIC MATTER IN THE PRESENCE OF ALKALI.

By J. M. Bremner; The Jour. of Soil Sci., Vol. 1, No. 2, pp. 198-204. January 1950.

The author attempted to obtain information about the nature and extent of the oxidation of soil organic matter in contact with alkali.

It was found that the oxygen uptake of a soil/alkali suspension varied with the soil, the alkali, and the concentration of the alkali; it is greater if the soil is first leached with acid. Absorption of oxygen by soil/alkali suspensions continued for very long periods. The rate of oxygen uptake was greatly increased by shaking. Little or no uptake of oxygen occurred when soils were treated with neutral reagents such as sodium pyrophosphate or fluoride, but extracts obtained by the use of such reagents containing organic matter that absorbs oxygen rapidly when treated with alkali. Most of this organic matter passed into the acid-insoluble (humic) fraction when such extracts were acidified. With the soils tested, oxidation of soil organic matter in contact with alkali did not lead to an increase in the amount of alkali-soluble material.

- - - - - - - -

OUTLINE OF STUDIES AND PRESENT FIELD ARRANGEMENT.

By C. A.Van Doren, H. B. Atkinson, and Owen Kirby; SCS and Ill. Agr. Exp. Sta. Mimeo. June 1950.

The authors describe the research projects being conducted in soil and water conservation at the northwestern Illinois Soil and Water Conservation Experimental Station at Joliet, Illinois. These studies include crop rotations designed to develop, test and improve cropping practices; terraces to determine their effect on surface drainage, crop yields, and the operation of farm machinery; corn-hybrid and nitrogen tests to determine the best variety of corn and the proper amount of nitrogen needed; mulching study to determine the effect of mulch on yields of corn and the effectiveness of the mulch on erosion; and to determine the effect of surface and tile drainage systems.

- - - - - - - -

TUCUMCARI TUMBLEWEED TRAP.

By Ray J. Lyman; The Reclamation Era, Vol. 36, No. 7, pp. 138-139. July 1950.

The author describes a very simple and relatively inexpensive trap designed and constructed to control tumbleweeds in irrigation canals. It consists of straight, smooth wires strung four inches apart across the ditch at an angle of not greater than 20° with the embankment. These are stretched taut and held parallel in a vertical plane from a few inches above the water surface to half the depth of the water. Iron posts or piling securely anchored sustain these wires at either end. The lower end is located at the inside toe of the embankment several feet out in the water from the bank. From this lower end, a mesh or hogwire enclosure extends parallel to the embankment downstream any desired distance, providing a pocket or trap for the weeds. They

glide along the wires into this trap and are carried to the lower portion of the trap by the current.

They can then be removed by a wide fork operated from a dragline boom at much less cost than removing them by hand.

- - - - - - - -

CONSERVATION FARMING PAYS.

By R. B. Hickok; Ind. Agr. Exp. Sta., IN-R-1, Mimeo. June 17, 1950.

Conservation farming practices increased the acre net income by an average of $44.00 annually during the period 1942-1947, inclusive, over a corresponding income for watersheds where conventional farming practices were used. The average annual increase in crop yields per acre for the conservation farming practices during this period was 34 bushels for corn, 7 bushels each for soybeans and wheat and 1 ton for hay.

One group of six experimental watersheds (approximately 3 acres in area each) was farmed under a system of prevailing practices and another similar group was farmed with conservation practices.

- - - - - - - -

DESIGN AND OPERATION OF DRAINAGE PUMPING PLANTS.

By John G. Sutton; USDA Tech. Bul. No. 1008. May 1950.

The author discusses the factors influencing the design and operation of drainage pumping plants. The most important factors discussed include the relation of the pumping plant to the general plan of drainage, determination of static lifts and runoff to be pumped, selection of pumps and power equipment, and the design of suction and discharge pipes.

- - - - - - - -

SELF-PROPELLED FERTILIZER SIDE-DRESSER.

By J. F. Davis, G. W. French, and D. B. Eldredge; Mich. Agr. Exp. Sta. Quarterly Bulletin, Vol. 32, No. 4, pp. 540-542. May 1950.

The authors describe a self-propelled fertilizer side-dresser designed to go between corn rows and apply fertilizer at any stage of growth. It consists of a rotating, top-delivery cylinder hopper mounted on the front of a garden tractor, and driven from the axle shaft of the driver sprocket which carried the track. Rates of application can be varied by the use of alternate sprockets at four points. The correct sprocket combination for any desired rate could be obtained by referring to a chart made up for the purpose.

- - - - - - - -

FARM LEASING PRACTICES ON 41 RENTED FARMS IN THE NORTHEASTERN ILLINOIS SLOWLY PERMEABLE SUBSOIL AREA.

By Wm. H. Heneberry, J. B. Cunningham and E. L. Sauer; Ill. Agr. Exp. Sta. Mimeo. AE-2745. June 19, 1950.

This survey was made among farmers cooperating in the study of the costs and benefits of soil conservation located on slowly permeable soils in order to determine leasing practices and attitudes toward adoption of conservation plans on rented farms. The study included three farms in Will County, six in LaSalle, six in Livingston, ten in Ford, seven in Vermilion, and nine in Iroquois County. The farms varied widely in soil productivity; corn yields in 1949 ranged from 26 to 70 bushels an acre, with an average of 45 bushels. This difference in yield shows that the productivity of these farms, located on similar soil types, vary widely because of past land use and soil treatment. The usefulness of this farm-leasing analysis is limited to farms having similar soil conditions, and the results do not apply outside the northeastern Illinois slowly permeable soils area.

- - - - - - - -

IRRIGATION TRIALS IN WESTERN NORTH DAKOTA.

By Arlon G. Hazen; N. D. Agr. Exp. Sta. Bul. 358. May 1950.

The author presents a factual report of irrigation experiments conducted at the Williston branch station. The timeliness of water application is of utmost importance. Definite time intervals between irrigation for each different crop as well as the amount of water to use have been developed.

- - - - - - - -

SOME FERTILIZER EXPERIMENTS WITH DECIDUOUS FOREST TREE SEEDLINGS ON SEVERAL IOWA SOILS.

By A. L. McComb; Iowa Agr. Exp. Sta. Research Bul. 369. November 1949.

The growth of seedling green ash, American elm, red oak and black locust was studied in relation to nitrogen, phosphorus and potassium fertilization of four Iowa soils. Fertilizers were added to B and C horizon soil materials and growth compared with that obtained on unfertilized surface and subsoils. The soils employed were the gray-brown podzolic forest Lindley and prairie Clarion, Tama and O'Neill. Factors causing

chlorosis on calcareous Clarion C horizon soil were also investigated.

Nitrogen was found deficient for growth of ash, elm and oak. Black locust, a legume, did not respond to nitrogen fertilization. As the residual soil nitrogen supply increased, growth response decreased in magnitude. On Tama C horizon soil with residual total nitrogen at 600 pounds per acre the response of American elm to added nitrogen was 600 percent, while on O'Neill soil containing 1900 pounds residual nitrogen responses were small or nil. The evidence suggests that about 200 pounds total nitrogen per acre is a level above which seedling nitrogen responses could not be expected under average conditions.

Phosphorus was found to be consistently and significantly deficient on Lindley soil only. Seedling responses to phosphorus were smaller than to nitrogen. On O'Neill a marked root growth response occurred with red oak. Potassium was not deficient on O'Neill or Clarion soils.

Severe chlorosis was associated with restricted growth of ash, oak and elm on calcareous Clarion C horizon soil. Inconclusive evidence pointed to unavailability of iron.

- - - - - - - -

SOUTHWESTERN RANGE PLANTS - BLACKBRUSH ACACIA.

By B. W. Allred; Sheep and Goat Raiser, Vol. 30, No. 10, pp. 28-29. July 1950.

The author describes blackbrush acacia, gives its distribution and discusses its economic and conservation value.

- - - - - - - -

SOUTHWESTERN TREES AND SHRUBS - GRAY OAK.

By B. W. Allred; Sheep and Goat Raiser, Vol. 30, No. 9, pp. 10-11. June 1950.

The gray oak is a slow growing tree or small shrub, which is important in the Davis Mountains in Texas and part of Mexico. Thin stands of gray oak are a boon to ranches where trees grow. Good grass management is good gray oak management, hence good ranch conservation.

- - - - - - - -

TOTAL SURFACE OF CLAYS IN POLAR LIQUIDS AS A CHARACTERISTIC INDEX.

By R. S. Dyal and S. B. Hendricks; Soil Sci., Vol. 69, No. 6, pp. 421-432. June 1950.

A simple gravimetric method based on retention of ethylene glycol has been developed for measuring total surface, external surface, and, by difference, internal surface for clays in water and other polar systems. A number of clay minerals and several clay fractions of soils were tested by the procedure. The results can be normalized against montmorillonite and the values obtained used as an index, important description of soils, that replace in part the need for mineralogical analysis of the clay fraction.

- - - - - - - -

EFFECT OF VARIOUS LEACHING TREATMENTS ON GROWTH OF ORANGE SEEDLINGS IN OLD CITRUS SOILS.

By Javes P. Martin; Soil Sci., Vol. 69, No. 6, pp. 433-442. June 1950.

On the assumption that a toxic substance is partly responsible for reduced growth of citrus trees in soils previously cropped to the same plant for long periods, experiments were conducted to determine whether soil leaching with various materials would overcome this growth-retarding effect.

It was found that leaching with 2 percent H_2SO_4 or with 2 percent KOH, followed by saturation of the soil colloids with calcium or a combination of calcium magnesium, potassium, and hydrogen, completely overcame the growth-retarding factors in old citrus soil.

Results support the hypothesis that, in addition to detrimental organisms a toxic material gradually accumulates in soil which is continuously cropped to citrus for long periods. This hypothetical material is toxic to citrus but not to other plants such as tomatoes and avocados; it is either insoluble in water or is absorbed by the soil and held against leaching with distilled water; it is apparently not absorbed as a replaceable base; and it is apparently destroyed by, or is soluble in, relatively strong acid or base solutions.

- - - - - - - -

INFLUENCE OF CULTIVATION AND WEED KILLERS IN SOIL STRUCTURE AND CROP YIELD.

By C. L. W. Swanson and H. G. M. Jacobson; Soil Sci., Vol. 69, No. 6, pp. 443-457. June 1950.

A report of 1 year's study on the effect of using 2,4-D and flaming and their indirect effect on soil structure versus killing weeds by the usual cultivation methods is reported.

- - - - - - - -

A HAMMER-DRIVEN SOIL-CORE SAMPLER.

By V. C. Jamison, H. A. Weaver, and I. F. Reed; Soil Sci., Vol. 69, No. 6, pp. 487-496. June

1950.

The sampler described here is little more than an enlarged-can-model Lutz sampler with the addition of a sliding hammer to drive the cutting edge of the sample can into a compact soil.

- - - - - - - -

PUDDLE EROSION - SOIL CONSERVATION VS MUD CONSERVATION.

By W. D. Ellison; The Land, Vol. 9, No. 2, pp. 203-208. Summer 1950.

Despite the fact man has engaged in a struggle with soil erosion ever since he first started stripping the mantle of native vegetation from the surface of the earth, he scarcely has advanced his conservation concepts and practices beyond the stage of mud conservation.

The raindrops that fall in violent storms have great capacity to erode, damage and destroy soils. Their blasts, when they strike bare ground, resemble miniature bombs. Their sharp impacts, as they beat on the naked earth, shatter the clods and crumbs of soil and break down its structure. The beating puddling actions of the rain then compact the soil's finely broken parts into an impervious layer of surface mud.

This compacted surface layer is made still more dense and impervious as it strains some of the colloids and other fines out of turbid rainwater that infiltrates from the surface down into the soil.

Contouring operations and terraces, while holding back muddy runoff, have no effect whatsoever on controlling splash erosion. It follows that where these are used on bare lands, their purpose is to retain as much mud as possible on the hillsides. They do not protect soil structures against puddle erosion damages.

- - - - - - - -

THE EFFECT OF FERTILIZER AND SEEDING ON THE ESTABLISHMENT OF GRAZED FIREBREAKS.

By T. H. Silker, L. E. Crane and J. C. Smith; Tex. Agr. Exp. Sta. Progress Report 1247. May 11, 1950.

A study was begun in Jasper County, Texas in 1949 to develop an effective deterrent to wildfire through the establishment of grazed firebreaks. The study involved the value of fertilizers and introduced grass species in inducing preferential grazing by livestock on planned strips. Nitrogen and potash were used at the rates of 0 to 60 pounds per acre and P_2O_5 at, 0, 60 and 120 pounds per acre. These materials were used singly and in combinations. The areas were seeded to a mixture of dallis, carpet and Bermuda grass and common lespedeza.

Grazing reduced the forage height on plots receiving nitrogen alone, but not enough to produce what is considered an effective firebreak. However, phosphorus alone did induce sufficient free-choice grazing to create a ground condition considered a satisfactory firebreak.

- - - - - - - -

A FALLING HEAD PERMEAMETER FOR EVALUATING PERMEABILITY.

By George B. Bradshaw and William W. Donnan; USDA-SCS, Research. Multilithed. January 1950.

The authors developed a method for making permeability tests which is simple of design and operation, will give quick, yet reasonably accurate results, and is suitable for field use. The device is known as a falling head permeameter. The techniques of use of the device, and in fact the design, are still being revised and improved upon. The write-up herewith describes the device as it is presently being used.

- - - - - - - -

FOREST SURVEY PROCEDURES FOR AREA AND VOLUME DETERMINATIONS.

By Maxwell E. Becker; Jour. of Forestry, Vol. 48, No. 7, pp. 465-469. July 1950.

The author outlines procedures for determining forest area and timber volume. The survey procedure is divided into four parts:

1. The determination of preliminary forest and unforest areas.

2. The determination of preliminary forest area by stand-size and topographic-site class and, in addition, the selection of plots for field examinations.

3. The establishment of field sample plots to obtain a stand tally, tree diameter growth, and other pertinent information.

4. The office computation and adjustment of data obtained in steps 1 through 3 in order to obtain final forest area and timber volume statistics for a given geographic area.

- - - - - - - -

A PRACTICAL STREAM GAUGE RECORDER HOUSE.

By L. W. Zach; Jour. of Forestry, Vol. 48, No. 7, pp. 491-493. July 1950.

The author gives the details of a good substantial low-cost gauge-house constructed of local lumber in a short time, developed and installed by the Salman Spawning Streams Project of Southeastern Alaska.

- - - - - - - -

SHRUB INVASION OF SOUTHERN ARIZONA DESERT GRASSLAND.

By Albert L. Brown; Jour. of Range Mgt., Vol. 3, No. 3, pp. 172-177. July 1950.

A study was made of shrub invasion in the desert grassland under open grazing, cattle exclusion, and total protection from cattle and rodents in Southern Arizona. Changes in numbers of burroweed and mesquite were directly correlated with grazing pressure. Total protection was insufficient to decrease the numbers of burroweed materially. It did not retard the increase of mesquite sufficiently to appear as a usable method of control. Increases of other shrubs showed little relationship to protection.

- - - - - - - -

ESTIMATING PERENNIAL GRASS UTILIZATION ON SEMI-DESERT CATTLE RANGES BY PERCENTAGE OF UNGRAZED PLANTS.

By Mack E. Roach; Jour. of Range Mgt., Vol. 3, No. 3, pp. 183-185. July 1950.

The author discusses the "percent ungrazed" utilization range survey method. The method employs a graph of the relation between the percent of plants ungrazed and the amount of forage removed. Sampling has shown this relation to be fairly constant. The average percent of all palatable perennial grass clumps ungrazed, as determined by paced transects, is entered on a simple reference graph and percent utilization is read directly.

- - - - - - - -

A COST-BENEFIT ANALYSIS OF SEEDING ABANDONED FARM LAND TO CRESTED WHEATGRASS BY THE PREPARATORY CROP METHOD.

By E. E. Meik; Jour. of Range Mgt., Vol. 3, No. 3, pp. 190-197. July 1950.

A cost-benefit evaluation of 585 acres of seeding depleted range or cultivated range land is presented.

- - - - - - - -

MECHANICAL TREATMENTS ON WYOMING RANGE LAND.

By O. K. Barnes; Jour. of Range Mgt., Vol. 3, No. 3, pp. 198-203. July 1950.

Both small-type closely spaced furrows and pitting significantly increased the forage production on shortgrass range. Larger furrows spaced at intervals of five to ten feet or more do not significantly increase the total production of the range.

Pitting or similar treatment appears beneficial to typical shortgrass range and is most effective if the stand contains some of the taller grasses. The value of mechanical treatments amounted to about a one-third increase in grazing capacity with a corresponding increase in animal gains.

- - - - - - - -

CONCENTRATED SPRAYS FOR APPLICATION BY MIST BLOWERS FOR CONTROL OF FOREST, SHADE AND FRUIT TREE PESTS.

By S. F. Potts and Philip Garman; Conn. Agr. Exp. Sta. Cir. 177. May 1950.

The purpose of this paper is to report the progress that has been made in formulating concentrated insecticidal and fungicidal sprays suitable for use in machines that apply low volumes of liquid. The formulas given are primarily for the control of forest and shade tree insects and for fruit pests, but they may be used effectively for control of many other similar pests. Although they were developed for use in mist blowers, many of them are suitable for use in aircraft as well.

- - - - - - - -

PUMPING FOR IRRIGATION.

By Ivan D. Wood; USDA-SCS-TP-89. May 1950.

Extensive use of ground water for irrigation has come about within recent years and is still expanding. Census figures for the year 1940 indicated that about 2,000,000 acres of land now receives the entire irrigation water supply from wells, while nearly 2,000,000 additional acres receive their supply partly from ground water and partly from surface-stream sources. There has been a tremendous increase in the number of wells. In 1920, 34,790 irrigation wells were in use in the western 17 States. By 1940, this figure has increased to more than 79,000.

The subject is discussed from the standpoint of the following points:

1. Availability, quality, and depth of water.

2. Water-table trends.

3. Legal or natural protection.

4. Suitability of farm for irrigation.

5. Operating costs and returns.

- - - - - - - -

FRICTION LOSSES IN SELECTED VALVES AND FITTINGS FOR IRRIGATION PUMPING PLANTS.

By Carl Rohwer; Colo. Agr. Exp. Sta. Tech. Bul. 41. May 1950.

The author carried out a series of tests on valves and fittings of the sizes used in pumping plants and under conditions similar to those found in irrigation pumping to determine friction losses.

It was concluded that the method of measuring the head losses used in this study is satisfactory; foot valves cause considerable loss in head; strainers and bell entrances both reduce the loss of head at entrance when used separately; all types of check valves increase the head loss in pipe, but the automatic drainage gates cause less loss than the other types; losses through gate valves are small when wide open, but the losses increase as the percentage of opening decreases; friction coefficients computed from the data on losses through valves show that they are not constant for each valve or series of valves with the same setting; and friction losses measured in terms of the equivalent length of pipe are based on the assumption that the friction coefficients are reasonably constant.

- - - - - - - -

PASTURE - - -STAFF OF LIFE FOR LIVESTOCK.

By D. W.Colvard; N. C. Agr. Exp. Sta. Research and Farming, Vol. 9, Prog. Rpt., No. 1, pp. 4-5. July 1950.

North Carolina needs more pasture to feed its present livestock, to produce livestock products it now consumes, and to produce livestock products, it should consume. A goal of two acres for every animal unit is set.

- - - - - - - -

SEED PASTURE ON THOSE " LOAFING" ACRES.

By W. W. McPherson; N. C. Agr. Exp. Sta., Research and Farming, Vol. 9, Prog. Rpt. No. 1, p. 6. July 1950.

To produce 100 pounds of total digestible nutrients it cost $0.58 for improved ladino pasture, $1.35 for alfalfa hay yielding 3 tons per acre, $1.77 for corn producing 50 bushels per acre, and $2.07 for oats yielding 50 bushels per acre.

- - - - - - - -

SEED PASTURE AND GIVE YOUR SOIL A BREAK.

By T. L. Copley and W. W. Woodhouse, Jr.; N. C. Agr. Exp. Sta. Research and Farming, Vol. 9, Prog. Rpt., No. 1, pp. 7-8. July 1950.

Good permanent sod is almost as effective as protected woodland in conserving soil and water. In addition, grasses and legumes add organic matter, improve soil tilth and increase the yields of crops that follow.

- - - - - - - -

PASTURE ADDS MORE POUNDS AT LESS EXPENSE.

By R. K. Waugh and E. R. Barrick; N. C. Agr. Exp. Sta. Research and Farming, Vol. 9, Prog. Rpt., No. 1, pp. 9-10. July 1950.

Pasture is the cheapest of livestock feeds. In the South where it can be grown the year around, pasture can largely eliminate the added labor of harvesting, storing and drying feed for the winter months. Pasture holds the soil in place and adds nutrients and humus, thus boosting the yield of crops that follow.

- - - - - - - -

OUR "MIRACLE" PASTURE PLANT.

By D. S. Chamblee; Agr. Exp. Sta. Research and Farming, Vol. 9, Prog. Rpt., No. 1, pp. 11-12. July 1950.

Ladino clover took a while to become "naturalized", but today it's the most valuable of forage plants in North Carolina. It's yields are high, it will grow on most soils and grow the year around if the rains come and the temperature ranges above freezing.

- - - - - - - -

FERTILIZER PAYS ON LADINO.

By W. W. Woodhouse, Jr.; N. C. Agr. Exp. Sta. Research and Farming, Vol. 9, Prog. Rpt. No. 1, pp. 13-15. July 1950.

High yields of Ladino clover do not come automatically. An ample supply of lime, potash and phosphorus is one of the secrets. These tests show that if any one of them is missing, the yield may be reduced - perhaps as much as two-thirds.

- - - - - - - -

KING COTTON GETS A RIVAL.

By D. S. Chamblee; N. C. Agr. Exp. Sta. Research and Farming, Vol. 9, Prog. Rpt., No. 1, pp. 16-17. July 1950.

A rival monarch is rapidly making friends among southern farmers. Alfalfa is becoming known for

high yields that may be grazed or cut as hay. Data are given demonstrating which varieties, which grasses and the seeding rates to use with alfalfa.

- - - - - - - -

FERTILIZING ALFALFA.

By W. W. Woodhouse, Jr.; N. C. Agr. Exp. Sta. Research and Farming, Vol. 9, Prog. Rpt. No. 1, pp. 19-21. July 1950.

Alfalfa needs plenty of plant food to produce the yields for which it is famous. On most soils, it needs heavy applications of lime, phosphorus and potash and small amounts of boron. Data are presented showing the effects of fertilizers on yields of alfalfa.

- - - - - - - -

NEW FORAGE VARIETIES FOR NORTH CAROLINA.

By C. H. Hanson; N. C. Agr. Exp. Sta. Research and Farming, Vol. 9, Prog. Rpt. No. 1, pp. 24-25. July 1950.

The new Atlantic variety of alfalfa yields up to a fourth more hay per acre than present varieties. An experimental line of lespedeza is outyielding Kobe and Korean two to one on some soils. A disease-resistant variety of big trefoil is another aim.

- - - - - - - -

DON'T TAKE WEEDS FOR GRANTED.

By Warren C. Shaw; N. C. Agr. Exp. Sta. Research and Farming, Vol. 9, Prog. Rpt. No. 1, pp. 30-31. July 1950.

The author discusses results obtained from the use of chemicals in controlling weeds in alfalfa and Ladino clover pastures.

- - - - - - - -

RELATIONS OF MICROORGANISMS TO TRANSFORMATIONS OF SULFUR IN SOILS.

By Robert L. Starkey; Soil Sci., Vol. 70, No. 1, pp. 55-65. July 1950.

This report deals principally with the kinds of transformations of inorganic and organic compounds of sulfur as well as elemental sulfur brought about by microorganisms. Most of the microorganisms referred to inhabit soils. Some are not typical soil organisms, but it is possible that the reactions they effect can be performed by some soil organisms. To characterize the transformations accurately, most of the studies were carried out in laboratory media rather than in soils.

- - - - - - - -

EFFECT OF SOIL ACIDIFICATION ON SOME CHEMICAL PROPERTIES OF A SOIL AND THE PLANTS GROWN THEREON.

By D. G. Aldrich and F. M. Turrell; Soil Sci., Vol. 70, No. 1, pp. 83-90. July 1950.

The chemical data pertaining to soil and plants which are presented in this paper are fairly typical of those obtained in soil acidification studies. The data on plant growth are indicative of the variation in response which can be expected when a variety of crops are grown on an acidified, alkaline soil.

Although the concentration of a number of essential plant nutrients is increased by acidification, the significance of this increase with respect to plant growth cannot be fully established at this time. The experiments reported show that some plants respond favorably to acidification whereas others respond unfavorably.

- - - - - - - -

ABSTRACTS OF RECENT PUBLISHED MATERIAL ON SOIL AND WATER CONSERVATION.

By J. H. Stallings; USDA-SCS, PA-150, Washington 25, D. C. July 1950.

The purpose of this publication is to bring together a summary of current information about soil and water conservation for ready reference to those who are actively engaged in soil conservation work. It contains abstracts of papers published by personnel of the Soil Conservation Service, cooperating agencies and other conservation workers. It consists of subject matter index, abstracts, and author index.

- - - - - - - -

A PRACTICAL METHOD OF DETERMINING PROPER LENGTHS OF RUNS, SIZES OF FURROW STREAMS AND SPACING OF FURROWS ON IRRIGATED LANDS.

By Wayne D. Criddle; USDA-SCS. Multilithed. August 1949.

The author describes a method by which the man in the field, even though of limited irrigation experience and possessing a minimum of equipment, may make a few simple tests, analyze the results, and use them effectively in laying out farm irrigation systems.

- - - - - - - -

COSTS AND BENEFITS FROM SOIL CONSERVATION IN NORTHEASTERN ILLINOIS.

By E. L. Sauer, J. L. McGurk, and L. J. Norton; Ill. Agr. Exp. Sta. Bul. 540. June 1950.

Actual farm records are analyzed to show how certain conservation practices affect production and income; and estimates are given for the costs involved in establishing conservation programs on farms in Northeastern Illinois.

- - - - - - - -

MACHINERY FOR UTILIZING CROP RESIDUES FOR MULCHES.

By George B. Nutt; Agr. Eng., Vol. 31, No. 8, pp. 391-392. August 1950.

Three tillage methods for corn production involving the use of winter cover crops as sources of mulch were compared; namely, mulch balk, mulch disk, and plowed, clean cultivation. Data on yield, runoff, and erosion are summarized for the period 1943-49. Plant residue maintained as a mulch was very effective during this period in reducing runoff and erosion and the yields were not depressed over conventional methods.

- - - - - - - -

MACHINERY PROBLEMS IN MULCH FARMING.

By L. L. Harrold and F. R. Dreibelbis; Agr. Eng., Vol. 31, No. 8, pp. 393-394. August 1950.

The author discusses some of the machinery problems encountered in farming with the use of mulches. Corn yields on mulch-culture plots at Wooster and Columbus, Ohio, have in general been less than on plowed plots. Where a straw mulch was applied on the sod after it was plowed, however, the corn yields were not depressed.

- - - - - - - -

APPLICATION OF THE DOUBLE-CUT PLOW PRINCIPLE TO MULCH TILLAGE.

By J. H. Lillard, J. E. Moody, and T. W. Edminster; Agr. Eng., Vol. 31, No. 8, pp. 395-397. August 1950.

The authors briefly summarize the results from the mulch-tillage investigations conducted in Virginia during the past six years and point out those problems on which they consider further experimentation is required.

- - - - - - - -

SOME RESULTS OF MULCH TILLAGE FOR CORN.

By E. R. Baugh, R. B. Hickok, H. Kohnke and I. D. Mayer; Agr. Eng., Vol. 31, No. 8, pp. 398-400 and 402. August 1950.

The authors conclude that crop residues used as mulches offer possibilities for erosion control and moisture conservation on land where contouring operations are not feasible. Subsurface tillage with the residue left on the surface has resulted in the lowest yields and best erosion control. Mixed-residue tillage methods produced corn yields as high or higher than plowing on the lighter soils and substantially better control of erosion. Plowing resulted in the highest yields on the heavy soils, but it affords unsatisfactory protection from erosion without supplementary conservation practices.

- - - - - - - -

SOME RECORDS OF GRASSLAND FARMING IN WISCONSIN AND MINNESOTA.

By Orville E. Hays; USDA-SCS-TP-94. July 1950.

This report presents the results of a survey conducted in Wisconsin and Minnesota during the winter of 1949 and 1950 to obtain information about the results of grassland farming. The views of farmers who had practiced grassland farming were obtained, tabulated and analyzed.

- - - - - - - -

IRRIGATION AND VARIETY TRAILS WITH LETTUCE IN THE LOWER RIO GRANDE VALLEY.

By M. E. Bloodworth, N. P. Maxwell, P. E. Ross and W. R. Cowley; Texas Agr. Exp. Sta. Prog. Rpt. 1258. July 8, 1950.

A study was initiated in the fall of 1949 to determine the effect of different moisture levels and different spacings within the row on the quality and yield of lettuce on Willacy loam. Spacings of 8, 12 and 16 inches within 38-inch rows were investigated at 3 moisture levels.

Results obtained indicate that maximum quality and yield of lettuce was obtained with the wider plant spacing of 16 inches. Lettuce should be grown under conditions of medium to high soil moisture levels. The maximum use of moisture by the lettuce plant begins when the heads start to form and continues until maturity.

- - - - - - - -

SOUTHWESTERN TREES AND SHRUBS - TAMARISK OR SALTCEDAR.

By B. W. Allred; Sheep and Goat Raiser, Vol. 30, No. 11, pp. 18-20. August 1950.

The author describes tamarisk and discusses its economic value and methods of control.

- - - - - - - -

PORE SPACE AND AGGREGATION IN A CHERNOZEM SOIL AS AFFECTED BY AGE OF PERENNIAL GRASS SOD.

By J. Roger McHenry, L. L. Zook and H. F. Rhoades; Agron. Jour., Vol. 42, No. 8, pp. 377-380. August 1950.

A study has been in progress since 1935 to evaluate the effect of time in grass on the yields of crops and the properties of a Chernozem soil. The influence of period of time in grass on pore space and aggregation of Holdrege silt loam is described in this paper. The percentage of water-stable aggregates larger than 0.25 mm for 1- to 3- and 5- to 7-inch depths and crop yield 2 years subsequent to the grass cover are given.

Correlation coefficients indicated that during the first year of cropping, the percentage of water-stable aggregates in the 1- to 3-inch samples was correlated (1 percent level) with organic matter as measured by organic carbon and total nitrogen percentage. In the second year no correlation was found to exist between the percentage of aggregates and organic matter measurements. However, a highly significant correlation was obtained between the percentage of water-stable aggregates in the 1- to 3-inch samples and the percentage of 2μ clay. This latter relationship held true for the 5- to 7-inch depth in both years. Crop yields were not correlated with the percentage of water-stable aggregates.

- - - - - - - -

MODIFICATION OF THE SMITH-WELDON WET COMBUSTION PROCEDURE FOR THE MICRO DETERMINATION OF SOIL ORGANIC MATTER.

By Leon Chesnin; Agron. Jour., Vol. 42, No. 8. pp. 385-386. August 1950.

A study was made of a proposed micro method of determining the organic matter content of soils. Twenty soil samples, varying in organic matter content from less than 1 to about 7 percent, were analyzed by this procedure and the Smith-Weldon wet combustion method, of which it is a modification. There was close agreement between the two procedures.

- - - - - - - -

EFFECT OF FERTILIZERS AND LIME ON EMERGENCE, NITROGEN CONTENT, AND RATIO OF ROOTS TO TOPS IN HAIRY VETCH.

By E. B. Reynolds and J. C. Smith; Agron. Jour., Vol. 42, No. 8, pp. 387-389. August 1950.

The authors report the results of studies started in 1946 on Lufkin fine sandy loam soil to determine the effect of fertilizers on the germination of vetch seed, on the dry matter in roots and tops, on the percentage of roots and tops, and on the nitrogen content of vetch.

Fertilizers did not injure germination, and apparently superphosphate was beneficial. Application of nitrogen, phosphoric acid, and potash produced significant increases in total dry matter. Fertilizers also greatly increased the proportion of dry matter in the roots.

Fertilization increased the total pounds of nitrogen per acre in the tops and roots. The increase was greater in the roots and hence a greater percentage of the nitrogen was found in the roots with fertilization.

- - - - - - - -

BRUSH CONTROL AND PASTURE DEVELOPMENT IN THE RED PLAINS.

By Harry M. Elwell, Harley A. Daniel and Maurice B. Cox; Agron. Jour., Vol. 42, No. 8, pp. 390-394. August 1950.

This paper presents the results of studies on the development of pastures and meadows on land covered with scrubby, woody vegetation which does not give the grass a chance, and management of the land to prevent erosion and reinfestation by brush. The study is aimed at developing methods for removing and controlling brush and procedures for obtaining a protective cover for erosion control under continuous maximum production from the land.

- - - - - - - -

NUTRIENT DEFICIENCIES DIAGNOSED WITH FOLIAR ANALYSES AND PLANT TISSUE TESTS.

By J. A. Lynd, L. M. Turk and R. L. Cook; Agron. Jour., Vol. 42, No. 8, pp. 402-407. August 1950.

Results obtained in tissue tests reflected soil fertilizer treatments of nitrogen, phosphorus, and potassium on soil types differing widely in physical and chemical characteristics. A method for determining weak acid soluble manganese in fresh tissue was found to give a good indication of the total manganese present in the foliage of white bean plants. The third functioning basal leaf of corn plants, as used in the tissue tests and foliar analyses, was found to be a reliable indicator of fertilizer treatment. Periodic foliar analyses of corn plants indicated that plants change in composition as the season progresses.

- - - - - - - -

SUITABILITY OF VARIOUS SOILS FOR TUNG PRODUCTION.

By Mathew Drosdoff; USDA BPISAE, C-840. 1950.

The author describes soil conditions in Southeastern United States with particular reference to the growing of tung trees.

- - - - - - - -

MANAGEMENT OF NATURAL SLASH PINE STANDS IN THE FLATWOODS OF SOUTH GEORGIA AND NORTH FLORIDA.

By R. D. McCulley; USDA, Forest Service, C-845. 1950.

The purpose of this publication is to present in usable form the results of experimental work and of experience so that management of these stands will be guided by the best and most up-to-date information available.

- - - - - - - -

INFLUENCE OF EASTERN RED CEDAR ON SOIL IN CONNECTICUT PINE PLANTATIONS.

By Ralph A. Read and Laurence C. Walker; Jour. of Forestry, Vol. 48, No. 8, pp. 337-339. August 1950.

Physical and chemical properties of surface soil beneath eastern red cedar trees in pine plantations in Connecticut were found to be different from those beneath pines. Properties of the surface soil beneath red cedars were apparently influenced by the specific chemical nature of the cedar leaf litter, its decomposition products, and subsequent incorporation in the soil by earthworms.

- - - - - - - -

REPORT ON 1940 STUDY OF SHELTERBELT INFLUENCE ON CROP YIELDS WITH SUMMARY OF DATA 1935 TO 1940 INCLUSIVE.

By W.E. Barnes; USDA - Forest Service, Lake States Experiment Station. Typed. May 1941.

A total of 31 small grain fields, 58 fall crop fields, and in addition, 18 permanent fields (those adjacent to Forest Service Shelterbelts) were measured in 1940.

It was concluded that there is just as likely to be a gain as a loss at the "normal" field edge of small grain in an average year. The exposure of a small grain field edge to wind is probably of minor importance in that entering the area under the crop crown, the wind velocity is soon reduced to a "normal" for the field by the protection afforded by the crop itself. Small grains in the Dakotas were benefitted most to the north of shelterbelts, slightly to a limited extent on the south and west, and none on the east in 1940. In Nebraska and Kansas, small grain yields indicated a slight benefit to the north of belts with no definite trends in other directions.

Corn in Nebraska showed a strong benefit to the north of belts, limited benefit on the east and west, and a deleterious effect on the south. In the Dakotas ear and fodder corn showed a slight possible benefit to the north. A very slight benefit was shown on the west with a deleterious effect on the east to ear corn. Fodder corn to the south showed a benefit with little trend shown on the east. Potato yields showed a possible beneficial influence on the east and south with a harmful trend to the north.

Snow moisture from drifts probably accounted for a major part of the benefit shown even in Nebraska and Kansas, in fact, could have accounted for all beneficial influence.

- - - - - - - -

ANNOTATED BIBLIOGRAPHY ON SEDIMENTATION.

USDA-SCS, Sedimentation Bulletin No. 2, February 1950.

This bibliography has been compiled as a guide to the literature on the engineering aspects of sedimentation. Every effort has been made to cover all of the known sources of information in the English language. To make the bibliography of maximum usefulness each reference has been annotated and indexed with respect to subject matter and geographical location.

- - - - - - - -

IDENTIFICATION OF MINERALS IN SOME CLAY BY X-RAY DIFFRACTION PATTERNS.

By H. W. Van DerMarel; Soil Sci., Vol. 70, No. 2, pp. 109-139. August 1950.

The purpose of this paper is to give exact X-ray data on minerals that may occur especially in the clay separate ($< 2\mu$) of soils so that identification of an X-ray pattern of an unknown clay sample is facilitated.

- - - - - - - -

FIXATION OF NITROGEN IN RICE SOILS BY ALGAE AS INFLUENCED BY CROP, CO_2, AND INORGANIC SUBSTANCES.

By P. K. De and M. Sulaiman; Soil Sci., Vol. 70, No. 2, pp. 137-151. August 1950.

The purpose of this study was to determine the part algae played in the process of nitrogen recuperation in rice soils.

It was found that both growth and fixation of nitrogen, by algae in rice soils were considerably increased in the presence of the rice crop. This increase was much greater where the soil was treated with a nitrogenous inorganic mixture.

- - - - - - - -

COMPARATIVE FLUORINE UPTAKE BY PLANTS IN LIMED

AND UNLIMED SOIL.

By Annie M. Hurd-Karrer; Soil Sci., Vol. 70, No. 2, pp. 153-159. August 1950.

These atudies were undertaken to determine the extent to which fluorine can be absorbed from soils by plant roots, and the extent to which the absorption can be controlled by liming.

- - - - - - - -

THE CLIMATE, SOILS, AND SOIL-PLANT RELATIONSHIPS OF AN AREA IN SOUTHWESTERN SASKATCHEWAN.

By William A. Hubbard; Scientific Agriculture, Vol. 30, No. 8, pp. 327-342. August 1950.

Certain of the relationships that exist between plant communities and soil, and climatic factors that influence their growth were studied. The area lies within the mid-grass prairie formation in the southern part of the province of Saskatchewan, Canada.

- - - - - - - -

SOLVING THE DRAINAGE PROBLEMS IN BARRIER AREAS.

By George B. Bradshaw and William W. Donnan; Paper presented at meeting of the Amer. Soc. of Agr. Eng., Salt Lake City, Utah. March 1950.

Drainage problems in irrigated areas generally occur where a barrier of heavy textured soil impedes the movement of excess irrigation water or seepage. There are two types of soil barries which cause the water table problems. The most spectacular type of barrier often encountered in the flat irrigated valleys of the west can best be described as a long transverse subsurface dike or clay bar which lies at right angles to the general direction of subsurface seepage flow. The second and most common type of barrier is a layer or stratum of soil which underlies an entire area and prevents the natural release of ground water downward and out of the root zone of plant growth. Each of these types presents a problem in drainage design. The discussion herewith describes both of these barrier types and how the design problem on them has been solved.

- - - - - - - -

CONSERVATION AS A MOVEMENT.

By Carl C. Taylor; Jour. of Soil and Water Conservation, Vol. 5, No. 3, pp. 103-105 and 114. July 1950.

The soil conservation movement has already moved far beyond the technical job of building terraces, check dams and laying out contour strips. It is calling for a national land policy and some of its adherents are calling for a national population policy. There are other evidences that the conservation movement in the United States is becoming a people's movement. This is tremendously significant for all real movements are people's movements. Until they become such they do not get anywhere.

- - - - - - - -

QUAIL STUDIES ON A RIVER FLOOD PLAIN.

By Walter Rosen, Jr.; Jour. of Soil and Water Conservation, Vol. 5, No. 3, pp. 111-114. July 1950.

Studies in the southeast show that farm lands improved with modern cropping and soil building practices produced more quail than unimprobed lands. This is based on the proper interspersion of cover types and particularly the amount of borderline between row-crops and cover suitable for nesting.

- - - - - - - -

A METHOD OF COMPUTING CONSERVATION BENEFITS OF A RANGE PROGRAM.

By Carroll H. Dwyer; Jour. of Soil and Water Conservation, Vol. 5, No. 3, pp. 115-124. July 1950.

The author has developed and outlined a practical method of computing the amount a rancher can afford to spend to obtain desired levels of production from his range as well as what benefits he might expect. The method presented is a quick and easy means of determining costs and benefits for various uses.

The proposed method of evaluation uses the share method of rental determination. Ranges are classified according to kind of site, and each site is graded as to range condition - the condition varying from excellent to very poor. The average safe rate of stocking is determined for each site and range condition class. It is then possible to predict fairly accurately the productive capacity in terms of pounds of animal products produced for each site and range condition.

- - - - - - - -

LAND USE AND TROUT STREAMS.

By Geoffrey E. Greene; Jour. of Soil and Water Conservation, Vol. 5, No. 3, pp. 125-126. July 1950.

Once-productive trout streams can be restored by the control of stream temperatures through good watershed management. This involves careful manipulation of vegetation and other kinds of land use practices. To accomplish this it is import-

ant that all aspects of a watershed be developed as a unit rather than on a piecemeal basis.

- - - - - - - -

GRASS SEED PRODUCTION.

By Louis P. Hamilton and W. M. Wooton; Ariz. Agr. Exp. Sta. Bul. 228. July 1950.

The production of grass or legume seed offers a new crop in a rotation to build up organic matter, improve soil texture, and provide a cash return at the same time.

It is not possible to predict possible demand for seed of the species described. Growers should anticipate moderate to strong competitive prices depending upon the ease of production of heavy yields. From 3 to 10 acres of any one species is a desirable acreage limit until the grower has gained some experience under his own conditions.

The production requirements of a number of adapted grasses and legumes are discussed.

- - - - - - - -

A RECORDING SOIL PENETROMETER.

By L. S. Robertson and C. M. Hansen; Mich. Agr. Exp. Sta. Quarterly Bul, Vol. 33, No. 1, pp. 1-4. August 1950.

The soil penetrometer described herein is mechanically actuated. The pressure required to force the probe into a soil is recorded on the abcissa of a graph. The depth to which the probe penetrates a soil is recorded on the ordinate. The force is theoretically one component, that of compressing a given calibrated coil spring. Owing to the fact that a coil spring performs a straight line function, a graph can be drawn. The ordinate of the graph is obtained from the action of a rod attached to a pad which rests on the surface of the soil.

- - - - - - - -

SOLVING THE SILT MYSTERY.

The Reclamation Era, Vol. 36, No. 9, pp. 167 and 180. September 1950.

By using various wartime Navy techniques developed to locate submarines and sunken ships and to chart the ocean floor it has been estimated that Hoover Dam, on the Colorado River, has a useful life of at least 275 years regardless of river-carried silt deposits.

- - - - - - - -

RESISTANCE TO FLOW IN ROUGH CHANNELS.

By Ralph W. Powell; Trans. Amer. Geo. Union, Vol. 31, No. 4, pp. 575-582. August 1950.

A formula, $C = -42 \log_{10} (C/\underline{R} + e/R)$, is developed for the resistance to flow in open channels, which it is believed is an improvement over Manning's or other formulas hitherto proposed. Graphs are given for the solution of this equation with three different groups of given quantities.

- - - - - - - -

A GRAPHICAL METHOD FOR INVESTIGATING THE STABILITY OF FLOW IN OPEN CHANNELS OR IN CLOSED CONDUITS FLOWING PARTLY FULL.

By Francis F. Escoffier; Trans. Amer. Geo. Union, Vol. 31, No. 4, pp. 583-586. August 1950.

By making use of rectangular coordinates in which a certain stage variable w is plotted as the horizontal coordinate and the mean velocity v as the vertical coordinate, some interesting properties of flowing water can be investigated. The method is then applied to a circular conduit flowing partly full.

- - - - - - - -

THE DYNAMIC CONCEPT OF SEDIMENT SOURCES.

By Gunnar M. Brune; Trans. Amer. Geo. Union, Vol. 31, No. 4, pp. 587-594. August 1950.

Using 200 upland sample areas and 23 valley cross-sections, a study was made of rates of sediment production and sediment sources from the headwaters of the Sangamon River of Illinois to its mouth. It was found that as the size of drainage area increases, the upland sources of sediment, such as sheet and gully erosion, become less important, while the bottomland sources, such as streambank erosion, floodplain scour, and valley trenching, become constantly more important. The writer maintains that this dynamic concept of changing sediment sources with changing size of drainage area applies not only to the Sangamon River Watershed, but to any watershed.

It was also found that the annual rate of sediment production in the Sangamon watershed decreases from an average of 2940 tons/sq. mi. of drainage area in the headwaters to 746 tons/sq. mi. at the mouth. This agrees with previous studies by the writer, which show that generally rates of sediment production decreases with increasing size of drainage area, for reasons which are set forth in the text.

The dynamic concept of sediment sources is compared with the previously widely used static concept based upon total erosion figures in a watershed, and the errors involved in the older

concept exposed.

One of the more important conclusions drawn from this study is that streambank and other forms of bottomland erosion have not been given enough attention by the various agencies concerned with their control, in comparison with their importance when viewed in the light of the dynamic concept.

- - - - - - - -

NUMERICAL SOLUTIONS FOR TILE DRAINAGE OF LAYERED SOILS.

By James N. Luthin and R. E. Gaskell; Trans. Amer. Geo. Union, Vol. 31, No. 4, pp. 595-602. August 1950.

The problem of the tile drainage of a uniform soil lying above an impermeable layer is solved by the relaxation method and compared with the analytical solution. The error in flow found by the relaxation method is less than four percent, with greater accuracy obtainable if a finer net is used. The method is readily adaptable to complex problems involving layers of different permeabilities. As an example, the problem of the tile drainage of a two-layered soil with surface soil used for trench backfill, for which no analytical solution exists, is solved numerically.

- - - - - - - -

FLUID RESISTANCE OF COMPOSITE ROUGHNESS.

By H. A. Einstein and R. B. Banks; Trans. Amer. Geo. Union, Vol. 31, No. 4, pp. 603-610. August 1950.

A series of flume experiments was conducted to determine the composite resistance of different types of roughness opposing the flow of water through an open channel. Each of the roughness types investigated possessed a distinctive geometrical shape and each type contributed resistance to the flow. The different types of roughness were acting on the same surface and each could be assumed to be uniformly distributed over the surface. The combined or composite resistance was sought in terms of the resistances which the individual roughness types exerted.

Within the range of the variables tested, it was found that the total resistance exerted by combined types of roughness is equal to the sum of the resistance forces exerted by each type individually.

- - - - - - - -

GRASSLAND FARMING INCREASES NEED FOR POTASH CONSERVATION.

By Myron A. Bachtell; Ohio Agr. Exp. Sta. Farm and Home Research, Vol. 35, No. 265, pp. 51-53. July-August 1950.

High yielding meadow crops require more potash than large grain crops. When the farm program on highly fertile soil is changed to permit keeping a larger proportion of the land in high yielding grass crops, there is a considerable increase in the total amount of potash involved in this revamped program. The really big increase, however, is where successful shifting has been made possible by the use of limestone and phosphate. In many cases these have raised soils of low productivity to levels which permit from 3 to 5 tons of hay per acre.

Emphasis thus must be placed on the fact that more potash is involved in grassland farming than in grain production.

- - - - - - - -

WOODLAND IMPROVEMENT AND HARVESTING.

By James W. Meteer and W. R. Anderson; Ohio Agr. Exp. Sta. Farm and Home Research, Vol. 35, No. 265, pp. 57-58. July-August 1950.

The management of a farm woods is based upon a few sound and proved forestry practices: (1) Timber is harvested in the form of large mature trees at short periodic intervals; (2) Younger trees are left standing to grow into harvest sizes for future cuts; (3) Quality and growth are increased by "culling" out poor trees and making all the light, space, and soil nutrients available to the thrifty and high value trees.

It sounds simple. That it is simple and quite profitable is borne out by the experiences of a few farmers. Feeling that their woodlands are an important part of the farm and should bear their portion of farm production, these farmers have developed simple plans for systematic harvests at periods of 1 to 5 years. A 20-acre woods will yield 4-5 thousand board feet every year.

- - - - - - - -

NEW CHEMICAL CONTROLS TURF INSECTS.

By J. B. Polivka; Ohio Agr.Exp. Sta. Farm and Home Research, Vol. 35, No. 364, p. 47. May-June 1950.

In 1949, a new material - a chlorinated hydrocorbon known as heptachlor - was used experimentally for the first time in Ohio, and with good results, for the control of several kinds of white grubs.

The treatment of 4 pounds of the 25 percent heptachlor powder per acre caused a reduction of 98.9 percent of the Japanese beetle grub population and 100 percent of the annual and the

three-year white grub populations. The treatment containing 20, 40, and 80 pounds of the 25 percent heptachlor powder per acre caused a complete elimination of all white grub species present.

- - - - - - - -

QUALITY OF WATER IN THE SEVIER CHANGES FROM UPPER TO LOWER BASINS.

By D. W. Thorne and J. P. Thorne; Utah Agr. Exp. Sta. Farm and Home Sci., Vol. 11, No. 3, pp. 45 and 54-56. September 1950.

The Sevier River is one of the most intensively used irrigation streams in the world. Hardly a drop of the water is actually wasted. However, the intensive use of irrigation waters presents many problems, including regional distribution of the water, water rights, storage, crop production, and the control of salt.

The irrigation waters of the Sevier River area have been chemically analyzed at various periods during the irrigation season. On the basis of these analyses the waters have been classified according to quality. These quality ratings are shown for a number of streams. These data indicate that in general the tributaries of the Sevier River have a satisfactory water quality rating. The principal questionable waters are those of Nine Mile Reservoir near Sterling and the water in the San Pitch River near the entrance to the Gunnison Reservoir and that flowing out of the Gunnison Reservoir. These streams show a sufficiently high salt content to reduce the growth of many crops and enough sodium possibly to cause some soil deterioration in a few of the soils highest in clay content.

- - - - - - - -

RANCHER! CRESTED WHEATGRASS IS WHAT YOU WANT.

By Wesley Keller; Utah Agr. Exp. Sta. Farm and Home Sci., Vol. 11, No. 3, p. 49. September 1950.

Crested wheatgrass, over the years since its introduction a half century ago, has earned an enviable place among drought-resistant forage plants. It has earned this place the hard but sure way. As recently as 15 years ago it was thought of as a good grass for the northern Great Plains. Now it is widespread throughout the Intermountain Region. One of the remarkable qualities that it possesses is its ability, once established, to resist invasion by other species. This is a "must" for effective range reseeding.

- - - - - - - -

SEEDING RANGES TO GRASS REQUIRES PROPER METHODS AND HARDY VARIETIES.

By C. Wayne Cook and L. A. Stoddart; Utah Agr. Exp. Sta. Farm and Home Sci., Vol. 11, No. 3, pp. 52-53 and 56. September 1950.

Since 1943, research has been conducted on foothill sagebrush areas near Benmore, Utah, in an effort to determine the adapted species and most desirable methods of seeding for developing spring range. The results of the first trials have been reported, but more recent studies have added much to our knowledge of seeding foothill ranges in this area.

Generally, these studies indicate that in the fall broadcasting gives stands comparable to or sometimes better than drilling and at lower cost, but broadcasting must be done correctly and in conjunction with plowing or some means of soil scarification. In the spring, however, drilling has given better results than broadcasting.

- - - - - - - -

ARE INSECTICIDES TOXIC TO SOIL MICROORGANISMS?

By L. W. Jones; Utah Agr. Exp. Sta. Farm and Home Sci., Vol. 11, No. 3, pp. 58-59. September 1950.

Since the use of insecticides and weedicides has become general, scientists and farmers have been concerned as to whether these chemicals would have a detrimental effect on the microflora of the soil and indirectly on crop production. Certain phases of this problem have been investigated to determine whether some of the commonly used insecticides are toxic, if they build up in the soil finally killing the soil organisms, and if there are concentrations at which they may be safely used.

In view of the data the conclusion was drawn that on the particular soils tested it would be safe to add DDT, chlordane, or benzene hexachloride in concentrations of .01 percent or less without serious damage to either the ammonifying or nitrifying bacteria. Recommended amounts of these insecticides for insect control would leave less than this amount of residue in the soil. If these recommended amounts are used, it is doubtful whether the insecticides would ever reach a concentration in the soil much higher than .001 percent unless succeeding treatments accumulate in the soil. Evidence has been obtained, however, that considerable decomposition of DDT had occurred after 2 years in the soil. If the top layer of soil received most of the treatment the concentration of course would be considerably higher and it may be possible for injury to microorganisms to occur in the vicinity of the insecticide.

- - - - - - - -

UPKEEP OF SOUTHERN GREAT PLAINS WHEATLANDS.

By H. H. Finnell; Okla. Agr. Exp. Sta. Mimeo. Cir. M-204. August 1950.

Where land had been in cultivation 30 years or so and no effort made to control wind erosion upon it, the loss in production averaged 7 bushels of wheat per acre ... Out of this 7-bushels loss in yielding capacity, 4.2 bushels were due to removals of fertility by erosion, 2.8 bushels were due to removals of fertility by crops taken off the land.

Removals by cropping have progressed directly in relation to yields. But "erosion damages reduced yields very rapidly during the early part of the erosion experience". During those years the rich organic matter of the topsoil was being removed.

The effect of lost fertility has been masked by improved yields due to better varieties and better tillage. The 7-bushel loss due to lowered fertility has been balanced by a 7-bushel increase due to new, higher-yielding wheats and the better cultivation possible with power equipment.

- - - - - - - -

HOLDING WATER IN FARM PONDS.

By H. N. Holtan; USDA-SCS-TP-93. July 1950.

The author found that soils other than clay can be used for holding water, and with even better results. In order to use this information, it is necessary to explain three basic principles of farm pond seals; namely, the case-wall, wet-side seal, and bag types. Fundamental differences in these principles of farm pond design are illustrated.

- - - - - - - -

DRYLAND GRASS SEEDING IN WYOMING.

By O.K. Barnes, R. L. Lang, and A. A. Beetle; Wyo. Agr. Exp. Sta. Bul. 299. June 1950.

The seeding of certain types of range lands in Wyoming is an important range-improvement practice. The establishment of grass, which was once thought to be a very difficult and hazardous undertaking is a relatively simple and successful procedure in many areas if attention is paid to the small details of seeding methods and to selection of species best adapted to the site involved.

Wyoming has a great diversity of topography, climatic conditions, and soils, and consequently no single species or establishment method can be recommended for all. General recommendations as to seed coverage, preparation of a firm seedbed, elimination of competition, etc. may well be applied to all locations, but the varieties must be selected for their adaptation to site, and the actual method of putting the seed into the soil must be modified to conform to the physical characteristics of the site involved.

Less is known about species adaptation and seeding methods for the high elevations than for other areas. However, many of the newer cultivated species and strains of grasses, as well as many of the natives, are showing promise for the mountain areas. Principal grasses which seem to be promising for high-elevation seedings are: Tall wheatgrass, meadow foxtail, Primar slender wheatgrass, Russian wildrye, smooth brome, and such natives as tufted hairgrass.

On the desert areas, where the annual precipitation averages under 10 inches, consistently good results have been obtained only with seedings of crested wheatgrass. Seeding in the early fall (about September 10) and early spring (about April 10) have been equally successful in establishing this species. Western wheatgrass and Russian wildrye seedings have infrequently given fair to good stands under desert conditions.

The greatest amount of research pertaining to grass seeding has been conducted on the plains area of Eastern Wyoming. The species which were most easily established and apparently best adapted to this area were crested wheatgrass, western wheatgrass, and Russian wildrye. Blue grama grass is well adapted to the area but more difficult to establish.

Early spring and early fall seeding dates were about equally successful in establishment of the early-season grasses, and late-spring seeding was the only date when blue grama was successfully established.

Clean crop stubble was the best seedbed, being superior to clean, cultivated land principally because of reduced damage to seedlings through wind action. The type of drill used appeared to have little effect upon the stand as long as the seed was planted at proper depth.

Nurse crops proved detrimental to a grass seeding. The seeding of a legume with the grass was found to maintain the yield of the area at a high level for a greater period of years than where the grass was seeded alone.

- - - - - - - -

FLATLAND SOIL CONSERVATION.

By B. A. Myers; Agr. Eng., Vol. 31, No. 2, pp. 78-79. February 1950.

Flatland soil conservation and its problems evolve mostly around the water; either it is a question of too much water or not enough. Water influences almost everything that we do on flat

land as well as on the upland. Cities like Saginaw, Michigan, spend millions of dollars to get fresh water for their own use. Just recently a 48-inch line 60 miles long, costing 11 1/2 million dollars, was completed to get fresh water from Lake Huron into Saginaw and Midland. This tremendous job was necessary because of pollution. The river water could not be filtered sufficiently to overcome this. Because of the soil load the water is too thick to drink and too thin to plow. It carries a tremendous amount of soil. This is agricultural pollution and much of the soil comes from flat land. The river is choked with silt; fish and other aquatic life also suffer. River bottoms are raising.

- - - - - - - -

CONSUMPTIVE USE OF IRRIGATION WATER BY CROPS IN NEVADA.

By Clyde E. Houston; Nev. Agr. Exp. Sta.Bul. No. 185. June 1950.

The author presents data on the consumptive use of water by crops for 26 areas in the State.

- - - - - - - -

LAND USE AND SOIL CONSERVATION IN JAPAN.

By C. L. W. Swanson; Jour. of Soil and Water Conservation, Vol. 3, No. 4, pp. 159-164. October 1948.

This article briefly discusses land use practices and soil erosion occurring in Japan, especially as they pertain to the uplands of that country. Some information is also included on the soils and crops of Japan.

- - - - - - - -

WINTER CONSTRUCTION OF CANAL LININGS READILY ACCOMPLISHED USING BURIED ASPHALT MEMBRANE.

By The Asphalt Institute, Cobb-Stebbins Bldg., 1250 Stout St., Denver 4, Colo. NL No. 11. August 1950.

Asphalt membrane canal lining provides a most positive seepage control at the lowest cost and it can be readily constructed under the most adverse conditions. The job done on the Bureau of Reclamation Project in the Goshen Irrigation near Tarrington, Wyoming is described.

- - - - - - - -

THE EFFECTS OF MOISTURE, SPACING, FERTILITY AND THEIR INTERRELATIONS ON SUGAR BEET PRODUCTION.

By R. W. Leaner, C. E. Nelson and F. G. Viets; USDA BPI,SAE, Research Rpt. No. 196. August 30, 1950.

A study was conducted on Ephratu fine sandy loam on the Moses Lake Development farm in the Columbia Basin in Washington to determine if it was suitable for growing sugar beets. The results indicate that excellent yields of sugar beets can be produced on the newly irrigated soil. Twenty-four to 36 inches of water is required to keep the entire profile of this shallow soil well supplied with moisture. Best results are obtained when the water is applied uniformly throughout the entire growing season.

- - - - - - - -

THE SILT LOAD OF TEXAS STREAMS, 1948-1949, PROGRESS REPORT NO. 11.

By Dean W. Bloodgood; Texas Bd. of Water Engin. Austin, Texas. Multilithed. August 1950.

The purpose of the silt studies is to make a determination of the characteristics of the suspended silt load of Texas streams. The eleventh annual progress report for Silt Load of Texas Streams is one of a series that has been prepared annually since 1939.

- - - - - - - -

ALFALFA - ITS MINERAL REQUIREMENTS AND CHEMICAL COMPOSITION.

By Firman E. Bear and Arthur Wallace; Better Crops with Plant Food, Vol. 34, No. 7, pp. 6-12 and 37-38. August-September 1950.

A field experiment, covering a 4-year period and involving a considerable number of variations in fertilizer topdressings, was undertaken on Nixon loam to study the requirements of alfalfa.

The highest field yields were obtained by topdressing with 180 pounds K_2O and 20 pounds borax. Applications in early spring were more effective than those made after the first crop had been removed. Nitrogen applications tended to encourage weeds, whereas potassium applications discouraged them.

Some confirmation of the concept that the exchange complex of the ideal soil for alfalfa should contain about 65 percent calcium, 10 percent magnesium, 5 percent potassium, and 20 percent hydrogen was obtained.

More than 80 percent of the Carotene and riboflavin in Ranger alfalfa was in the leaves. Anything that interferred with leaf development tended to lower the content of these constituents.

- - - - - - - -

BORON IMPROVED MEADOW.

By W. D. Bashore; Better Crops with Plant Food, Vol. 34, No. 7, pp. 18-21. August-September 1950.

The application of 20 pounds of borax per acre on meadow changed it from a failure to a success.

- - - - - - - -

BERMUDA GRASS CAN BE USED IN CORN ROTATIONS.

By Glenn W. Burton and E. H. DeVane; Better Crops with Plant Food, Vol. 34, No. 7, pp. 19-21. August-September 1950.

The observations reported here, although very preliminary in nature, seem to warrant the conclusion that corn can be easily and successfully grown on a heavy Bermuda grass sod following the methods described. Deep turning, surface planting, adequate fertilization, and cultivation with tractor equipment appear to be essential features of the practice.

- - - - - - - -

EROSION OF TOPSOIL REDUCES PRODUCTIVITY.

By J. H. Stallings; USDA-SCS-TP-98. August 1950.

The potential increase in agricultural output resulting from the vast improvements made in the science of crop production in past years has been offset in large measure by the damage to the soil resulting from the action of wind and water in the erosion process. The sifting and sorting action of wind and water separates the organic matter and silt and clay fractions from the soil mass and carries them from the field. The parts lost contain most of the essential plant nutrients and other life-giving substances.

Large quantities of these valuable materials may be removed from a field by the erosion process without entailing a corresponding loss of soil volume from the surface of the land. In extreme cases the soil is removed bodily. These life-giving substances usually constitute the first portion of the soil to be removed by erosion. The removal of the soil and the accompanying organic matter and plant nutrients by either wind or water erosion results in lowering the production potential of the soil.

- - - - - - - -

STOCKING NORTHERN GREAT PLAINS SHEEP RANGE FOR SUSTAINED HIGH PRODUCTION.

By E. J. Woolfolk; USDA Cir. No. 804. April 1949.

The purpose of this study was to develop a method by which Northern Great Plains sheep ranges could be stocked for sustained production. The object was (1) to get the greatest possible production year after year without deteriorating the forage and soil and (2) to permit recovery from drought within a reasonable time.

- - - - - - - -

A NEW SYSTEMIC INSECTICIDE.

By W. Scott James; Amer. Fertilizer and Allied Chemicals, Vol. 113, No. 6, pp. 11 and 28. September 16, 1950.

With the coming of several new organic insecticides and the study of their characteristics, it has been found that some of the new compounds are absorbed by the roots, leaves and stalks of certain plants. Research revealed that the parts of plants which had absorbed the insecticide and were attacked by insects were highly toxic to the attacking pest. The plants have been found to be toxic to certain insects long after spray residue has been dissipated by weather and normal chemical break down.

The systemic insecticide may be used as a spray, making diluted applications to the plant or it may be applied to the soil in a water solution and absorbed by the plant. In many cases, seeds may be soaked in a solution of the chemical, thereby being absorbed and held by the young seedlings to give protection against several insects for a number of days.

- - - - - - - -

GRAZING SPRING-FALL SHEEP RANGES OF SOUTHERN IDAHO.

By Joseph F. Pechanec; USDA Cir. No. 808. May 1949.

This publication is designed as a guide to assist the user and the administrator of sagebrush-grass sheep range in carrying out a three step program. The essentials of the program are:

1. Judge whether the relative range productivity is increasing or decreasing.

2. Prepare and carry out a grazing program that is based on this judgment.

3. Check each year to see whether grazing use is satisfactory. Make prompt adjustments when needed to correct for unsatisfactory use.

The program is based on practical experience, observation, and detailed experimental evidence secured through 20 years of study. While the principles here outlined are specifically applicable to southern Idaho, the more general ones should apply on most sagebrush-grass ranges that are being used for spring-fall sheep grazing throughout the West.

FOREST GRAZING WORK IN THE DEEP SOUTH.

By Robert S. Campbell; Proc. Soc. of Amer. Foresters, pp. 216-222. 1948.

The problem of forest grazing in the Deep South is largely one of better intergration of range livestock raising with other resources, with the forest on one hand and with farm pastures and feeds on the other.

Range livestock grazing is a mixed blessing to the forests. The animals consume much of the grass that would otherwise become rough, and they thereby reduce the fire hazard - a measurable benefit. In addition, cash returns from range livestock grazing are an important part of southern rural economy. Detrimental effects of forest grazing are damage to timber and sites from range fires, and direct grazing damage to tree reproduction, mainly by hogs and sheep, but also by cattle under certain circumstances.

- - - - - - - -

DETERMINING FORAGE WEIGHT ON SOUTHERN FOREST RANGES.

By Robert S. Campbell and John T. Cassady; Jour. of Range Management, Vol. 2, No. 1, pp. 30-32. January 1949.

The authors used an adaptation of the "weight estimate method" in determining grazing capacity on western ranges in estimating the weight of forage produced on southern forest ranges. The modified method aims at weight measurements of vegetation as forage, as an ecological response to forest or range management, or as fuel, according to the purpose of the study. In inventorying herbage, the procedure is to actually clip and weigh the total yield by herbage classes, while the species weight composition is estimated.

- - - - - - - -

SNEEZEWEED FALLS BEFORE 2,4-D SPRAYS.

By Clyde W. Doran; Colo. A & M News, 3(12):3. June 1949.

Recent experimental tests in western Colorado have shown that 2,4-D, the weed-killer that has proved so effective in controlling weeds on cultivated croplands, is a promising herbicide for sneezeweed. Tests were made during a two-year period to find answers to the questions: What types of commercial formulations of 2,4-D will kill sneezeweed? How much is needed? When and how should it be applied?

- - - - - - - -

CHEATGRASS (BROMUS TECTORUM L.) - AN ECOLOGICAL INTRUDER IN SOUTHERN IDAHO.

By George Stewart and A. C. Hull; Ecology, Vol. 30, No. 1, pp. 58-74. January 1949.

The many gaps in our information concerning cheatgrass cause difficulty in preparing a comprehensive treatise about it. However, the widespread experience with cheatgrass, its challenging responses, and a considerable number of studies dealing with its ecological and economic behavior, when taken together, make it possible to present this fairly reliable over-all view of its status.

- - - - - - - -

PRACTICAL GUIDES FOR SEEDING GRASS ON SKID ROADS, TRIALS, AND LANDINGS, FOLLOWING LOGGING ON EAST-SIDE FORESTS OF WASHINGTON AND OREGON.

By J. O. Gjertson; Ore. Forest and Range Exp. Sta. Research Notes, No. 49. January 20, 1949.

Seeding to perennial grasses is an effective method for stabilizing soil, preventing invasion by undesirable plants, and increasing forage production on ground denuded during logging. A survey in 1948 of 52 areas seeded between 1940 and 1946 found 80 percent of the seedings to be medium or better in success, and 45 percent good or very good in success. A careful check showed no evidence that these seedings decreased subsequent regeneration to ponderosa pine.

- - - - - - - -

UTILIZING FORAGE ON LONGLEAF PINE FOREST RANGES.

By John T. Cassady; Presented at Symposium on "The Forest Range in Southern Agriculture", Forestry Section, A.S.A.W. An. Meet. Baton Rouge, La. Feb. 2, 1949.

A range man's concept of grazing is conservative utilization of the forage, by the proper class of livestock, during the season that forage is good, under a system of planned management. On longleaf pine ranges, 40 percent utilization of grass herbage is regarded as the safe upper level of grazing. Managed grazing is far different from the unmanaged grazing that often destroys reproduction and probably damages soils.

- - - - - - - -

RESULTS OF PRELIMINARY TESTS OF PELLETIZED CRESTED WHEATGRASS SEED.

By E. W. Stevenson; Ore. Forest and Range Exp. Sta., Research Notes No. 53. April 25, 1949.

The results of this study at the present time can be stated only in terms of initial stands, but enough is known about crested wheatgrass seeding in cheatgrass to say that the success is closely related to the number of seedlings

established during the first growing season. The conclusions reached in this study are:

1. Pelletizing resulted in a reduction of 66 percent in the viability of seed used.

2. Drilling of free seed at the same rate was far superior to broadcasting of either pelletized or free seed in producing an initial stand.

3. The establishment of seedlings by use of pelletized seed was not improved over that of broadcast free seed.

- - - - - - - -

GETTING BETTER RECORDS OF VEGETATION CHANGES WITH THE LINE INTERCEPTION METHOD.

By A. L. Hormay; Jour. of Range Mgt., Vol. 2, No. 2, pp. 67-69. April 1949.

The purpose of this paper is to point out a few ways in which the line interception method can be employed more effectively in measuring changes in range vegetation. Particular attention is given to ways of increasing the accuracy of the method and of using the method to determine vegetation yield. The remarks are based on experiences with the method in pine timber, sagebrush, and meadow types in northeastern California and apply principally to bunchgrass types.

- - - - - - - -

ESTABLISHMENT OF VEGETATION ON DEPLETED SUB-ALPINE RANGE AS INFLUENCED BY MICROENVIRONMENT.

By Lincoln Ellison; Ecological Monographs, Vol. 19, pp. 95-121. April 1949.

The persistence of bare spaces and the tendency for new plants to invade masses of already established vegetation are significant to the problems of rehabilitation and management of mountain range-watershed land. The purpose of this paper is to describe these phenomena and to present the evidence relating to their cause.

- - - - - - - -

SOME PROBABLE FUTURE DEVELOPMENTS IN CONTROL OF NOXIOUS RANGE PLANTS.

By George E. Glendening; Jour. of Range Mgt., Vol. 2, No. 3, pp. 149-152. July 1949.

The trend in noxious plant control research probably will be toward the study of individual plant species on specific problem areas. The emphasis will be shifted so that research on individual plant responses may catch up with research on methods and materials. Many of the necessary investigations will require a degree of control which can be obtained only in the laboratory.

- - - - - - - -

PRELIMINARY GUIDE FOR RANGE RESEEDING IN ARIZONA AND NEW MEXICO.

By H. G. Reynolds, F. Lavin, and H. W. Springfield; Ariz. Forest and Range Exp. Sta. Research Rpt. No. 7. July 1949, Reprinted June 1950.

Range reseeding, properly done, can aid in restoring forage on many range lands. This publication, based on experience and research to date, explains briefly the why, when, where, and how of reseeding for several different kinds of range lands in Arizona and New Mexico.

- - - - - - - -

DEER FORAGE OBSERVATIONS IN UTAH.

By Justin G. Smith; Jour. of Wildlife Mgt. Vol. 13, No. 3, pp. 314-315. July 1949.

During the summer and early fall of 1947 a study of deer food habits was made on an area of the Uinta National Forest, Utah. The study area had been closed to livestock grazing for a number of years and attempts had been made to reseed some of the larger, non-wooded openings at the higher elevations.

The vegetal types consisted mainly of oak, maple, and aspen with a few small scattered stands of spruce-fir on the north-facing slopes.

- - - - - - - -

EFFECTS OF HERBAGE REMOVAL AT VARIOUS DATES ON VIGOR OF BLUEBUNCH WHEATGRASS AND ARROWLEAF BALSAMROOT.

By James P. Blaisdell and Joseph F. Pechanec; Ecology, Vol. 30, No. 3, pp. 298-305. July 1949.

The study described in this paper was made to determine the effects of clipping at various dates on vigor of bluebunch wheatgrass and arrowleaf balsamroot. Although the ground-level clipping used in this study is probably more severe than grazing and is different in many other respects, it does indicate the period during which plants are most susceptible to injury.

- - - - - - - -

USE OF CALIFORNIA ANNUAL-PLANT FORAGE BY RANGE RODENTS.

By Henry S. Fitch and J. R. Bentley; Ecology, Vol. 30, No. 3, pp. 306-321. July 1949.

This paper reports on the potential destructiveness of three range rodents, as determined in enclosures at the San Joaquin Experimental Range.

WEIGHT AND GAIN OF RANGE CALVES AS AFFECTED BY RATE OF STOCKING.

By E. J. Woolfolk and Bradford Knapp. Jr.; Mont. Agr. Exp. Sta. Bul. 463. August 1949.

This bulletin presents eight years, 1938 through 1945, of results from a cattle grazing experiment conducted near Miles City, Montana, to show the effects of rate of range stocking on the weight and gain of Hereford calves from birth through their second summer to approximately 18 months of age.

- - - - - - - -

USES AND MODIFICATIONS FOR THE "MOOSEHORN" CROWN CLOSURE ESTIMATOR.

By George A. Garrison; Jour. of Forestry, Vol. 47, No. 9, pp. 733-735. September 1949.

The "moosehorn", a new instrument developed in Canada, has been tested on eastern Oregon forested ranges and, with modifications, found useful for measuring percentage crown closure or crown cover. It is simple to use. All that is involved in many applications is to hold the instrument in a vertical position, look through a side aperture, and count the number of dots on a transparent upper surface that are covered by tree crown.

It was found that red dots on the template provided good contrast with the green foliage. Red dots permitted direct count and tally of dots covered by tree crown. This eliminates dependence on a count of dots in the open spaces for a condition of good contrast.

- - - - - - - -

COMPETITION BETWEEN SAGEBRUSH SEEDLINGS AND RESEEDED GRASSES.

By James P. Blaisdell; Scology, Vol. 30, No. 4, pp. 512-519. October 1949.

This paper describes several studies which deal directly with the competition between sagebrush seedlings and reseeded grasses.

- - - - - - - -

STOCK-POISONING PLANTS OF THE EASTERN SEABOARD.

By William A. Dayton; Proc. Soc. of Amer. Foresters, pp. 222-232. 1948.

The author discusses the stock-poisoning plants in the eastern part of the United States.

- - - - - - - -

SAGEBRUSH TO GRASS.

By Richard M. Hurd; Amer. Cattle Producer. April 1949.

The author outlines a successful procedure whereby a ranchman can change from sagebrush to grass.

- - - - - - - -

FOREST GRAZING IN SOUTH ALABAMA AND WEST FLORIDA.

By J.J. Brasington; La. Southern Forest Exp. Sta. Multi. November 1949.

This paper summarizes cattle management practices in the region and relates these practices to characteristic forest grazing areas. It suggests improved range and livestock management methods, recommends better integration of forest and range management, and points out specific forest grazing problems needing research.

- - - - - - - -

RANGE RESEARCH CONTRIBUTIONS.

By W. R. Chapline; Proc. of the Inter-American Conference on Conservation of Renewable Natural Resources, Denver, Colo. Sept. 7-20. 1948.

Improved range management offers possibilities for sustained forage and livestock production, improvement of depleted ranges, greater production per animal or per acre of range or both, lower costs and greater profits. This is true in the western plains or mountain country, the South or other range areas of the United States. Range furnishes cheap forage for livestock in an integrated range-farm agricultural enterprise.

- - - - - - - -

MERRIAM KANGAROO RAT A FACTOR IN MESQUITE PROPAGATION ON SOUTHERN ARIZONA RANGE LANDS.

By H. G. Reynolds and G. E. Glendening; Jour. of Range Mgt., Vol. 2, No. 4, pp. 193-197. October 1949.

Merriam kangaroo rats collect mesquite seeds as a preferred food item. Not all the harvested seed is consumed, and a large portion is buried in shallow caches. Mesquite seed stored in such caches, if not rediscovered by rats, germinates during favorable climatic years, resulting in the emergence of seedlings at some distance from the parent tree.

As mesquite increases, perennial grass decreases, and greater numbers of Merriam rats occupy the habitat. Hence, once the grass density on range lands is reduced so that the habitat is favorable for rats, and mesquite becomes established, the mesquite seeds may continue to be further spread by rats, as well as by livestock and other agencies. Consequently, on such areas any

attempts to stop or retard the invasion of mesquite through a reduction in livestock should also consider control of the Merriam kangaroo rat.

- - - - - - - -

RESEEDING RESEARCH.

By W. R. Chapline; Amer. Cattle Producer. June 1949.

Although research has made considerable progress in developing answers to range reseeding problems in the West, there are still many unanswered or only partly answered. When these can be answered for the 67 million acres of range needing reseeding, but for which efficient and economical specifications cannot yet be given, a vast new supply of forage will become available. Not only will this add greatly to the wealth of the west through greater livestock production, but more forage will be available for wildlife, and better watershed protection will also be afforded.

- - - - - - - -

OUTLINE GUIDE FOR RESEEDING RANGES IN SOUTHERN IDAHO.

By Richard M. Hurd and Ray O. Petersen; Idaho Intermountain Forest and Range Exp. Sta. Multi. March 1949.

The purpose of this outline guide is to assemble in a concise and clear form the essential phases that need to be considered in reseeding those ranges in Southern Idaho which are primarily in private ownership. As a result of this type of presentation, some local conditions may not have been adequately covered to satisfy fully those wishing to reseed their range. However, the principles as here developed should prove useful although the suggested procedures may need to be altered somewhat. Additional information can be secured from the references listed at the end of the outline.

- - - - - - - -

RECENT RESEARCH IN POISONING SOUTHERN WEED HARDWOODS.

By Henry Bull and R. S. Campbell; Southern Weed Control Conference, La. State Univ., Baton Rouge, La. Multi. January 31, 1949.

Winter is the best season for using Ammate crystals in low cups on blackjack-oak -- the most effective way of using Ammate on this species. Spring and summer are almost as good, however, and the differences are likely to be of no practical importance. Spring and summer treatments with a 2-pounds-per-gallon Ammate solution in frills ranks next, and again the differences are likely to have no practical importance.

Sodium arsenite in frills in the best treatment for bitter pecan.

There is a general tendency for crown kill to increase during the first 2 years after poisoning with Ammate and sodium arsenite. Basal sprouting tends to increase slightly in the first 2 years after applying Ammate crystals; and to decrease slightly during the second year after applying Ammate solution.

- - - - - - - -

RANGE RESEEDING.

By A. C. Hull, Jr; Wyoming Range Mgt. Issue No. 8. Mimeo. February 1949.

The author discusses the essentials to successful reseeding of ranges:

1. Kill the brush and weeds, and prepare a good seedbed.

2. Get the seed in the ground but not too deep.

3. Plant the right grass at the right season.

4. Do not let the cattle (or sheep) eat it all up.

- - - - - - - -

PROGRESS IN RANGE MANAGEMENT.

By W. R. Chapline; The Ames Forester, Vol. 36, pp. 52-64. 1949.

Although range research has made considerable progress in developing answers to grazing management and reseeding problems, especially in the last ten or twelve years, there are still many problems unanswered or only partly answered. Much information now available in only rough form, must be refined. Because of the great variation of vegetation, soils, and climatic characteristics -- from the desert lands supporting sparse vegetation to the highly productive mountain meadows -- there is need for a great deal more information on practices that will give optimum production on all major range types. The wide variation, too, in productive condition on deteriorated ranges presents many unanswered problems relating to range restoration through management and reseeding. Studies, too, should be extended to many important range types and areas not previously investigated. These offer opportunities for greater range livestock production than can be fully realized only with the advance in knowledge which can best be accomplished through research.

- - - - - - - -

THE SANTA RITA EXPERIMENTAL RANGE.

By Matt Culley; Ariz. Southwestern Forest and Range Exp. Sta. Multi.

The author recommends and discusses seven practices that will help obtain better range management based on results of studies and observations on the Santa Rita Experimental Range.

- - - - - - - -

SUMMARY OF RECORDS FROM 128 FARMS ON SLOWLY PERMEABLE SOILS IN NORTHEASTERN ILLINOIS, 1949.

By W. H. Heneberry, E. L. Sauer, and H. C. M. Case; Ill. Agr. Exp. Sta. AE-2759. August 1950.

This is a summary of the results of studies conducted on 128 farms in the slowly permeable soils area of Northwestern Illinois for the year 1949. Forty-four of the farms are located on predominantly Clarence-Rowe soils, 40 on predominantly Swygert-Bryce, and 44 on soils that are a mixture of these types and other slowly permeable soils.

In general, differences between high-conservation and low-conservation farms were greater on the Clarence-Rowe and mixed soils than on the Swygert-Bryce soils. In all three groups the high-conservation farms had a lower land value and a lower proportion of tillable acreage in the farm, but their total farm investment per acre was higher.

- - - - - - - -

TURF CULTURE.

By J. A. DeFrance and J. A. Simmons; Rhode Island Agr. Exp. Sta. 62nd. Annual Rpt. p. 12. June 1950.

Complete prevention of crabgrass in putting green plots of Rhode Island Colonial bent resulted from periodic applications of PMAS throughout the summer. Concentrations of 1.6 and 1.3 ounces in 10 gallons of water were applied to each 1,000 square feet. Treatments started May 19 before crabgrass was noticable and continued at 10 to 20 day intervals until August 6. On untreated check plots, crabgrass infestation was as high as 48 percent.

In another test, crabgrass was allowed to develop to the 3-leaf stage and then 5 applications of PMAS, 10 days apart, were made. Concentrations were 2.1 ounces and 1.6 ounces in 10 gallons of water per 1,000 square feet. Crabgrass was completely controlled on the treated plots, while untreated plots had from 40 to 55 percent infestation.

Three applications of PMAS gave 89 to 99 percent control of established crabgrass in the lawn turf plots. A concentration 2.1 ounces in 5 gallons of water per 1,000 square feet was used and applications were at 10 day intervals starting July 8. What few weed plants escaped were so retarded in growth that they did not mature and set seed.

- - - - - - - -

CHEMICAL WEED CONTROL.

By F. B. Muller and T. E. Odland; R. I. Agr. Exp. Sta. 62nd. An. Rpt. pp. 21-22. June 1950.

Applying 2,4-D to corn at pre-emergence or when plants were about 4 inches high gave good control of annual weeds. When applications were delayed until weeds were established, control was poor.

Very little injury resulted from any of the applications of the butyl ester of 2,4-D. Applying the chemical at pre-emergence or shortly after the corn came up resulted in yields comparable to those from the plots receiving no chemical but cultivated 3 times. Applying the chemical early in the season, before the weeds came up, eliminated one and possibly 2 of the early cultivations. Delaying the application of the herbicide until the weeds were established resulted in lowered yields. All fields were cultivated at least once.

- - - - - - - -

MULCHES FOR BLUEBERRIES.

By V. G. Shutak and E.P. Christopher; R. I. Agr. Exp. Sta., 62nd. An. Rpt. pp. 26-27. June 1950.

Blueberry bushes on sawdust mulched plots have consistently produced higher yields during the 4-year period of the study. The difference between straw mulching and clean cultivation, plus a cover crop was not consistent from year to year. Grass was hard to control in the straw mulched plots.

- - - - - - - -

ENLARGING THE USE OF SOIL SURVEY MAPS AND REPORTS.

By Emil Truog; Proc. Soil Sci. Soc. of Amer. Vol. 14, pp. 5-7. 1950.

The main purpose of a soil survey is to make an inventory of soils in the form of a map, accompanied with a descriptive report of the characteristics of the soils and their crop adaptability.

The main use of detailed soil survey maps and reports is not made by farmers but by technicians

who contact farmers directly for the purpose of promoting sound land use, good soil management, and adequate conservation by the farmers. People dealing in land values and land transfers will, of course, continue to make extensive use of soil survey publications.

- - - - - - - -

THE EFFECTS OF LONG-TIME CULTIVATION ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF TWO RENDZINA SOILS.

By W. Derby Laws and D. D. Evans; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 15-19. 1950.

This study was initiated to determine the type and extent of some of the physical and chemical changes resulting from long continued cropping, in direct comparison with soil under virgin prairie. The study has been confined largely to Houston black clay.

Cultivation for 50 to 90 years has decreased the pores drained under tensions of 30 centimeters of water in Houston black clay. The air space of undisturbed soil cores measured in a pressure pycnometer at field moisture content was 50 to 100 percent greater for virgin soil than for cultivated soil. This was true at all depths sampled.

Virgin Houston black clay contained a much higher percent of 5- to 2-mm aggregates to a depth of 42 inches than the cultivated soil. It also had more total aggregates. There has been a marked decrease in organic matter and nitrogen to a depth of 18 inches due to cultivation of Houston black clay.

- - - - - - - -

MEAN WEIGHT-DIAMETER OF SOIL AGGREGATES AS A STATISTICAL INDEX OF AGGREGATION.

By C. H. M. van Bavel; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 20-23. 1950.

The importance of having a single value to represent the whole size distribution of aggregates is recognized and this paper is an attempt towards the construction of such an index.

A method of plotting, measurement, and calculation is proposed whereby the data of an aggregate analysis may be presented in one figure, characteristic for the distribution found.

The number found is essentially a mean weight-diameter and is a sensitive index of the aggregation status of the soil. Therefore, it may be used in statistical studies such as analysis of variance or correlation studies with crop yields and soil treatments in order to gain a quantitative evaluation of soil structure and the influences thereon. In addition the mean weight-diameter has a physical significance as it gives an estimate of the average size of the soil aggregates.

- - - - - - - -

PHYSICAL PROPERTIES OF SASSAFRAS SILT LOAM AS AFFECTED BY LONG-TIME ORGANIC MATTER ADDITIONS.

By A. Klute and W. C. Jacob; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 24-28. 1950.

The moisture equivalent, wilting point, aggregation, bulk density, percent air filled pores, and penetrability of a Sassafras silt loam were determined. This soil had received 0, 10, 20, and 40 tons of manure per acre per year and as a result the organic matter content ranged from 2.5 to 5.0 percent. The results may be summarized as follows:

1. No significant differences were found in the wilting point and the moisture equivalent.

2. The stability of the aggregates in the 2-5 mm fraction, separated from the air dry soil, was significantly increased at the higher organic matter levels.

3. The bulk density was significantly decreased in all cases where manure was applied.

4. Significant increases of the bulk density and decreases in the percent air filled pores were brought about by compaction due to sprayer and tractor wheels.

5. The penetrability of the soil was not affected by the manure treatments. Highly significant decreases in penetrability of the 6-9 inch zone was not affected by compaction or the manure treatments.

- - - - - - - -

AGGREGATION OF INORGANIC PARTICLES IN HESPERIA SANDY LOAM.

By Andrew P. Mazurak; Proc. Soil Sci. of Amer., Vol. 14, pp. 28-34. 1950.

The problem was to determine, approximately, the upper-size limit for the clay particles contributing to water-stable aggregates in Hesperia sandy loam. Separates from a micaceous soil were obtained by an ultimate analysis. Suspension of each separate was electrodialyzed and synthesized into a single dry aggregate. Similarly, aggregates formed from mixtures of separates were used. The dry aggregate was wetted under vacuum and the stability of the aggregate was determined by shaking it in water for 2, 20, 200 and 2,000 minutes. The size distribution of aggregates in water was then obtained by using a combination of methods: wet sieving, elutriation, gravity-sedimentation, and centrifugation.

A linear relationship was found to exist when the log of NH_4-adsorption capacity was plotted as a function of log of particle size. This study suggests that the ultimate analysis of soil should consider the particle size distribution of the clay fraction for determining the physical properties of soil.

- - - - - - - -

CRUSHING STRENGTH OF AGGREGATED SOIL MATERIALS.

By Donald C. Martinson and L. B. Olmstead; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 34-38. 1950.

The type of equipment developed by Hardesty and Ross for measuring the hardness of fertilizer pellets was used to measure the crushing resistance of sized aggregates and broken clods from plots on the Dry-land Agriculture project at the Hays, Kansas, experiment station. There was a significant decrease in crushing strength with increasing moisture content of aggregates. The aggregates with low moisture broke with a sudden rupture at a sharp endpoint, but at higher moisture contents plastic flow began and the endpoint was uncertain.

The crushing of 40 dry aggregates per plot was sufficient for differentiation of the clod strength of the 18 areas examined. In general the crushing resistance was least in the tilled layer of the continuous small grain plots, highest in the intertilled row crops, and intermediate in rotations containing both. Plots in grass or without tillage were intermediate. Crushing strength and bulk density both increase with soil depth. The relationship is significant for all depths on each plot, but for all plots at any one depth no relationship was found between the two measurements. A significant negative correlation between clod hardness and total nitrogen was found. No significant relationships were found between crushing resistance and moisture equivalent or aggregate stability, as measured by wet sieve analysis.

- - - - - - - -

MOISTURE CHARACTERISTICS OF SOME HAWAIIAN SOILS.

By M. D. Thorne; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 38-41. 1950.

This paper presents characteristic curves and related data for soils from six families in three groups, most of which are being used for pineapple production. The following conclusions may be drawn from the data presented.

1. Characteristic curves are somewhat similar to those for soils of comparable texture as reported by mainland investigators.

2. Agreement between moisture equivalent and 1/3 atmosphere percentage is close, the correlation coefficient being highly significant.

3. The average value for the ratio between moisture equivalent and 15 atmosphere percentage for 14 samples is 1.50. The average value for this ratio for 11 pineapple soils is 1.45.

4. A highly significant correlation between 15 atmosphere percentage and permanent wilting percentage determined by sunflowers is indicated.

- - - - - - - -

SOME TESTS OF A FOUR-ELECTRODE PROBE FOR SOIL MOISTURE MEASUREMENT.

By Don Kirkham and G. S. Taylor; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 42-46. 1950.

A four-electrode probe is described for rapid measurement of specific electrical conductivity, and hence, it is inferred, of the moisture content of soil. To determine the specific conductivity, electric current through two outer electrodes of the probe is measured, as is also the potential drop across the two inner electrodes. From these readings and a knowledge of the electrode spacing, the specific conductivity is computed by means of formulas supplied.

The method is independent of the manner in which current enters or leaves the soil, provided the electrodes are small compared to their separation. The method is due originally to Wenner and has been used extensively in geophysical exploration. In geophysical applications the electrodes may be hundreds of yards apart. In the present soil application the electrodes have been generally 3 inches apart. Field data are presented. The instrument needs further development, particularly in electronic features.

- - - - - - - -

SOME FREEZING POINT DEPRESSION MEASUREMENTS ON CORES OF SOIL IN WHICH COTTON AND SUNFLOWER PLANTS WERE WILTED.

By L. A. Richards, R. B. Campbell and L. H. Healton; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 47-40. 1950.

The moisture content of samples of 16 soils from western United States was reduced into the permanent wilting range by cotton and sunflower plants and freezing point measurements were made on cores of the soil. Observed freezing-point-depression values ranged from 0.59 to 3.56° C, corresponding to a soil moisture stress range from 7.1 to 43 atmospheres. A comparison with the 15-atmosphere-percentage indicates that the moisture content of these soils was reduced

toward the lower end of the permanent wilting range. Eighty percent of the stress values were above 20 atmospheres, whereas previous work indicates that at the first permanent wilting percentage the soil moisture stress ranges from 8 to 15 atmospheres.

It is evident from these measurements that there exists an appreciable range in the degree of severity of wilting symptoms and a wide range in soil moisture stress over the permanent wilting range of soil moisture. The freezing point method used in this study makes possible a more precise evaluation of soil moisture stress in relation to wilting than has been possible with previous methods. For 14 out of the 16 soils used in this experiment it was found that cotton plants brought the soil moisture to a higher stress at permanent wilting than sunflower plants.

- - - - - - - -

PERMEABILITY STUDIES ON SOME ILLINOIS SOILS.

By C. A. Van Doren and A. A. Klingebiel; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 51-55. 1950.

This paper is a preliminary report on permeability, pore space, and volume weight of some Illinois soils. These measurements were intended to serve as a guide in placing soils in the proper permeability class. A few typical soil types have been selected in each of four major soil areas in the state. Some data are also reported on the effect of soil treatment and cultivation on permeability of surface and subsurface soils.

- - - - - - - -

OXYGEN DIFFUSION IN POROUS MEDIA AS A MEASURE OF SOIL AERATION.

By Sterling A. Taylor; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 55-61. 1950.

In this article a method is proposed for measuring the rate of oxygen movement through the soil. The effect of a compaction and moisture content on the movement of oxygen has been investigated. A theoretical equation relating the change in partial pressure of oxygen and time has been derived and verified experimentally.

Based on this equation a new soil parameter λ was proposed which is a relative measure of the rate of diffusion of gases through the soil. It has the dimensions of length and can be interpreted physically as the length of a tube of unit cross section through which free diffusion is allowed to take place which will supply O_2 to a point at the same rate as it is supplied by the soil.

It was found that the value of λ increased with compaction for any one sample of material, but that different samples might produce lower values even though the bulk density of the sample is greater.

- - - - - - - -

FIELD MEASUREMENT OF OXYGEN DIFFUSION THROUGH SOIL.

By W. A. Raney; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 61-65. 1950.

An instrument suitable for field determinations of gaseous diffusion was devised. From measurements of the time rate of change of the partial pressure of oxygen of the air within the diffusion chamber, the diffusion rate was calculated.

The diffusion rate was compared with bulk density, percent moisture, and the partial pressure of oxygen of soil air following four methods of tillage and two 5-year rotations involving the incorporation of different amounts of organic matter into the soil. In general there was little difference between the effects of regular plowing and subsurface tillage on the above factors but disked and rotary tilled plots gave higher values for density and lower values for the diffusion rate and partial pressure of oxygen at 4-, 8-, and 12-inch depths. When the two rotations were compared, the partial pressure of oxygen was lower under the rotation with the larger quantity of incorporated organic matter yet the diffusion rate was higher which indicated better aeration even with the lower partial pressure of oxygen. There was general agreement between the observed diffusion rates and average yield of vegetables from these plots.

- - - - - - - -

MEASUREMENT OF THE AIR PERMEABILITY OF SOIL IN SITU.

By D. D. Evans and Don Kirkham; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 65-73. 1950.

A method has been developed for the measurement of air permeability of soil in situ. The method is unique in that the sample under measurement is not disturbed. The apparatus consists of two units: a tank equipped with a thermometer, manometer, and tire pump, and a unit composed of a glass tube supported by a tripod. A number of the tube units may be used in conjunction with the same tank.

- - - - - - - -

A SIMPLIFIED AIR-PICNOMETER FOR FIELD USE.

By M. B. Russell; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 73-76. 1950.

The versatility and easy operating characteristics of the device described in this article make it a useful instrument for the field evaluation of soil physical conditions.

- - - - - - - -

SEGREGATION PROCEDURE FOR THE MINERALOGICAL ANALYSIS OF SOILS.

By M. L. Jackson, L. D. Whittig, and R. P. Pennington; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 77-81. 1950.

A procedure is described for size-segregation of soil minerals according to the single-layer principle of sedimentation and decantation.

- - - - - - - -

MINERAL COMPOSITION OF THE CLAY FRACTION: II. OF SEVERAL COASTAL PLAIN, PIEDMONT, AND MOUNTAIN SOILS OF NORTH CAROLINA.

By N. T. Coleman, M. L. Jackson, and A. Mehlich; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 81-85. 1950.

The mineral constitution of the fine clay, coarse clay, and the fine silt fractions of the A, B, and C horizons of seven North Carolina soils were determined by means of X-ray diffraction, thermal, and potassium analyses.

- - - - - - - -

THE CALCIUM-POTASSIUM RELATIONSHIPS OF CLAY MINERALS AS REVEALED BY ACTIVITY MEASUREMENTS.

By C. E. Marshall and S. A. Barber; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 86-88. 1950.

The ionic environment of the plant root is an extremely sensitive function of the type of clay mineral present in the soil; the contrasts between clays of the montmorillonite group and those of the kaolinite group being exceedingly clear cut.

- - - - - - - -

RECIPROCAL EFFECTS OF MAGNESIUM AND POTASSIUM AS SHOWN BY THEIR CATIONIC ACTIVITIES IN FOUR CLAYS.

By E. O. McLean; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 89-93. 1950.

This paper deals with the reciprocal effects of potassium and magnesium in four different clay systems. The reciprocal effects of potassium and calcium on four clays were made evident by their cationic activities when measured by means of clay membranes in homoionic and biionic systems. In all the clays the presence of magnesium in the system was accompanied by an increase in the activity and the fraction active of the potassium when compared to potassium-hydrogen systems.

- - - - - - - -

REACTIONS OF BENTONITE AS INFLUENCED BY ADSORBED CATIONS AND GRINDING.

By Alfred T. Perkins; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 93-96. 1950.

Dry grinding bentonite destroys the montmorillonite complex. The decomposition products will reunite to form other minerals including kaolin. The formation of kaolin is favored by saturating the exchange complex with equal amounts of calcium and hydrogen. Calcium-saturated bentonite did not form kaolin on grinding, and hydrogen-saturated bentonite formed only minimum amounts.

- - - - - - - -

LIME REQUIREMENT OF SEVERAL RED AND YELLOW SOILS AS INFLUENCED BY ORGANIC MATTER AND MINERAL COMPOSITION OF CLAYS.

By U. S. Jones and C. Dale Hoover; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 96-100. 1950.

The purpose of this investigation was to determine the magnitude of the lime requirement of several red and yellow soils and how it was affected by the different base exchange materials which were found in these acid soils.

- - - - - - - -

AVAILABLE NONEXCHANGEABLE SOIL POTASSIUM AT THREE NORTHERN GREAT PLAINS LOCATIONS BY A NEUBAUER PROCEDURE.

By R. F. Reitemeier, R. S. Holmes, and I. C. Brown; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 101-105. 1950.

The occurrence of phosphorus deficiency and reduced crop yields in irrigated soils of the Northern Great Plains region led to the investigation of the availability of potassium reserves of soils at three locations within this area. Soil samples studied were from dry-land plots at Mandan, N. D., irrigated plots at Scottsbluff, Nebr., and both dry-land and irrigated areas at Huntley, Mont. The soils are not typical upland plains soils but were developed on river terraces.

A modified Neubauer method was used, in which the initial exchangeable potassium is subtracted from the sum of the potash uptake by the rye seedlings and the exchangeable potassium remaining after harvesting of the rye to furnish a measure of the available non-exchangeable potassium. Primarily because the exchangeable

potassium exceeded the uptake capacity of the seedlings, in a second trial the regular 100-gm portion of soil was reduced to 25 gm, which permitted a much greater differential draft on the potash reserves.

The three soils appear to have considerable reserves of readily available nonexchangeable potassium. Dry-land and irrigated rotations over a 30-year period have not measurably reduced the supply of potash as indicated by the Neubauer method. Even where the exchangeable potassium has been significantly reduced by removal in crops the availability of the reserves has been maintained.

- - - - - - - -

SOME EFFECTS OF SPRAY RESIDUES ON THE pH AND THE BASIC CATIONS OF THE SOIL, IN NORTHEASTERN McINTOSH APPLE ORCHARDS.

By T. W. Embleton and Damon Boynton; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 105-109. 1950.

Soils were sampled according to depth or distance from the tree or both in McIntosh apple orchards on Hoosic gravelly loam, Dover fine sandy loam, Dunkirk silty clay loam, and Dunkirk fine sand. The indirect effects on the soil of sulfur, lime-sulfur, and Fermate spray programs were studied.

Sulfur sprays were associated with a distinctly higher soil acidity and lower calcium content under the trees than were the Fermate sprays.

- - - - - - - -

THE EFFECT OF VARYING AMOUNTS OF GROUND LIMESTONE ON THE pH AND BASE EXCHANGE PROPERTIES OF SASSAFRAS FINE SANDY LOAM.

By W. W. Moschler, S.S. Obenshain, R. P. Cocke, and H. M. Camper; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 123-125. 1950.

Analyses were made of soil samples from plots in a rate of liming experiment on Sassafras fine sandy loam at Williamsburg, Va. The samples for analysis were taken after 23 years of liming at different rates and were obtained from two soil layers, 0-8 inches and 10-18 inches.

The 10-18 inch layer contained much less organic matter and dilute acid soluble phosphorus than did the 0-8 inch layer. However, the two layers compare favorably in pH, exchangeable hydrogen, calcium, magnesium and potassium, a factor possibly contributing to the well known productivity of this soil type.

In the 0-8 inch layer, with increased lime application, pH values have increased regularly from 4.91 to 7.11, exchangeable calcium followed nearly the same order, and exchangeable hydrogen reversed that of calcium. In terms of percentage saturation, the exchangeable hydrogen decreased from a high of 61 percent to a low of 28 percent at the extreme rates of application, while exchangeable calcium increased from a low of 24 percent to a high of 57 percent.

NONEXCHANGEABLE POTASSIUM REMOVAL FROM SOILS BY SUCCESSIVE ACID EXTRACTIONS AS RELATED TO REMOVAL BY GREENHOUSE CROPS.

By C. E. Evans and R. H. Simon; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 126-130. 1950.

The purpose of this investigation was to gain information regarding the status of nonexchangeable or fixed forms of potassium in several agriculturally important soils. Nonexchangeable potassium availability in these soils was measured by a cropping method using alfalfa as the test plant. These availabilities were compared with the amount of potassium solubilized in soils when subjected to repeated NH_4Ac or HCL extractions with intervening dryings.

- - - - - - - -

EFFECT OF FERTILIZATION ON THE YIELD AND CHEMICAL COMPOSITION OF PASTURE FORAGE AND AVAILABILITY OF SOIL NUTRIENTS.

By L. C. Kapp, J. C. Smith, and R. C. Potts; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 142-145. 1950.

A factorial experiment with four plots of each treatment was started in 1948 on a Lufkin fine sandy loam. Nitrogen, P_2O_5 and K_2O were applied at various rates and in all possible combinations. Graphs presenting the effects of the different treatments upon yields and percentages and total amounts of N, P, K and Ca in the forage are given. Available P, K, and Ca and pH values of the soil at two harvest dates each in 1948 and 1949 are discussed.

Nitrogen applications were highly effective in increasing forage yields. The increases in yields from N additions gave a straight line with the greater increases in yield occurring in 1949. The application of 150 pounds of P_2O_5 per acre increased the yields to the maximum.

Applications of N significantly increased the percentage of N in the forage produced. Applications of P_2O_5 were highly effective in increasing the percentage of P in the forage. The interaction, N X P_2O_5 greatly increased the forage yield but failed to affect the percentage composition significantly.

- - - - - - - -

THE MINERALIZATION OF ORGANIC PHOSPHORUS,

NITROGEN, AND CARBON IN CLARION AND WEBSTER SOILS.

By L. M. Thompson and C. A. Black, Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 147-151. 1950.

The amounts of organic phosphorus, nitrogen, and carbon mineralized during a 30-day incubation in the laboratory were determined in six pairs of virgin and cultivated soils of the Clarion-Webster soil association in Iowa. The virgin soils mineralized largerquantities of phosphorus, nitrogen, and carbon than did the comparable cultivated soils.

- - - - - - - -

MICROBIAL PRODUCTS AND SOIL ORGANIC MATTER: II. THE EFFECT OF CLAY ON THE DECOMPOSITION AND SEPARATION OF THE PHOSPHORUS COMPOUNDS IN MICROORGANISMS.

By C. A. I. Goring and W. V. Bartholomew; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 152-156. 1950.

Mixed microbial tissue, consisting of the washed cells of Aerobacter aerogenes, Bacillus subtilis, and Rhizobium sp. (Cowpea organism), was allowed to decompose in the presence of varying concentrations of kaolinite and bentonite. Characterization of the phosphorus bearing compounds was made before and after decomposition.

With the scheme of analysis used, clay did not prevent almost complete extraction of the organic phosphorus present although it did interfere with the normal distribution among the several organic fractions.

- - - - - - - -

APPARATUS FOR CONTROL OF MOISTURE, TEMPERATURE, AND AIR COMPOSITION IN MICROBIOLOGICAL RESPIRATION EXPERIMENTS.

By W. V. Bartholomew and F. E. Broadbent; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 156-160. 1950.

The apparatus and techniques described herein were developed and tested for use in plant decomposition experiments and represent a number of years experience in the study of control in respiration experiments.

- - - - - - - -

DECOMPOSITION OF 2,4-DICHLOROPHENOXYACETIC ACID IN SOIL AND LIQUID MEDIA.

By Arthur S. Newman and James R. Thomas; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 160-164. 1950.

The objectives of these investigations were to ascertain: (1) the influence of pretreatment of soil with various organic compounds on the persistence of 2,4-D, (2) the influence of rate of treatment with 2,4-D on its persistence, (3) changes in concentration of 2,4-D during the decomposition process, and (4) the decomposition of 2,4-D in liquid media by mixed and pure cultures of soil microorganisms.

The persistence of 2,4-D in soil was decreased by pretreatment of the soil with 2,4-D and certain other compounds having similar constituent groups. The pretreatment with certain closely related compounds, in some instances, had no effect on the persistence of 2,4-D which suggests that the population responsible for the decomposition is quite specific.

The persistence of 2,4-D at rates of 2.5, 10.0, and 50.0 mg per pound of soil was 8,11, and 21 days, respectively. On retreatment of these soils at a uniform rate of 10 mg per pound the presistence was reduced to 6 to 7 days. Mixed cultures from soils previously treated with 2, 4-D were more active than cultures from untreated soils in decomposing the compound.

- - - - - - - -

WATER-STABLE AGGREGATION IN ARTIFICIALLY SALINE AND SALINE-ALKALI SOILS.

By R. R. Reid, C. E. Leyendecker, and D. S. Hubbell; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 164-168. 1950.

The investigations reported here deal with effects on aggregation and microflora produced by additions of reagents to samples of normal Gila clay to simulate saline and saline-alkali soils.

Saline and saline-alkali conditions in Gila clay were simulated by adding two series of reagents in graduated concentrations to 100-gram samples of the normal soil. The reagents of the saline series were $MgCO_3$, $MgSO_4$, $MgCl_2$, $CaSO_4$, and $CaCl_2$; those of the saline-alkali series were 0.2, 0.5, 0.7, 1.0, and 1.5 grams per hundred grams of soil; those in the latter series, 0.1, 0.2, 0.5, 0.7, and 1.0 grams per hundred grams of soil. These samples were compared with samples of normal soil and of naturally saline or saline-alkali soil. After 90 days of incubation at 26° C, samples were analyzed for percentage of water-stable aggregates, pH, and numbers of fungi, actinomycetes, and bacteria.

In the saline-treatment series, with three exceptions, aggregation was significantly higher in the treated than in the normal samples. Very few were significantly higher in this respect than the naturally saline soil sample. No correlation was found between aggregation and numbers of microorganisms or between aggregation

and pH.

In the saline-alkali series of treatments, no effect was observed of Na_2SO_4 on aggregation, nor was there any correlation of aggregation with microbial numbers or pH. NaCl, NaOH, Na_2CO_4, and the highest concentration of $NaHCO_3$ depressed aggregation as compared to that of the normal soil; and with the last three there was a negative correlation with number of organisms and with pH.

- - - - - - - -

STRAINS OF RHIZOBIUM EFFECTIVE ON THE TREFOILS, LOTUS CORNICULATUS AND LOTUS ULIGINOSUS.

By Lewis W. Erdman and Ura Mae Means; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 170-175. 1950.

Twenty-two cultures isolated from various species of Lotus and one from Anthyllis vulneraria were used to study their effectiveness on Lotus uliginosus and two varieties of Lotus corniculatus grown under greenhouse conditions. In addition, highly effective strains representing five cross-inoculation groups were included. The following conclusions are drawn:

1. Different strains of Rhizobium isolated from Lotus uliginosus produced abundant nodulation and showed varying degrees of effectiveness on the host plant. They were ineffective in fixing nitrogen on Lutus corniculatus even though they did form nodules.

2. Strains isolated from Lotus corniculatus, proved effective on two varieties, arvensis and tenuifolius, of the host plant, but the nodules formed on Lotus uliginosus were of no benefit.

3. Plants of Lotus uliginosus when inoculated with the most effective strains contained about 10 times as much total nitrogen as those of Lotus corniculatus var. arvensis. Plants of Lotus corniculatus var. tenuifolius were about one-third as high in nitrogen as Lotus uliginosus but were two to three times richer in nitrogen than the variety arvensis.

4. One strain, 3E0j2, from Lotus angustissimus proved to be effective on both Lotus uliginosus and Lotus corniculatus.

5. Two strains, 3E0b5, from Lotus americanus, and 3E0e1, from Anthyllis vulneraria, were effective on Lotus uliginosus and on Lotus corniculatus var. arvensis. Both strains, however, were ineffective on the variety tenuifolius.

6. From these studies a selection of effective strains could be made to produce an inoculant which would contribute greatly to the successful growing of these legumes. It would seem inadvisable to mix strains from these two species for the inoculation of either one.

- - - - - - - -

A METHOD FOR DETERMINING THE CARBON DIOXIDE PRODUCTION OF STERILE AND NONSTERILE ROOT SYSTEMS.

By Herbert W. Heuszer; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 175-179. 1950.

A method is described for determining the carbon dioxide formed by roots of intact plants growing under either sterile or nonsterile conditions. The method may be adapted to other studies requiring the use of sterile root systems. The apparatus was assembled from ordinary laboratory glassware with the exception of a root chamber which was a 300 ml distilling flask having specially large openings. In preliminary results with sunflower plants growing in a mineral medium considerably larger amounts of carbon dioxide were formed by combined root-microbe systems than by roots alone.

- - - - - - - -

THE ANATOMY OF THE NODULAR GROWTHS ON THE ROOTS OF TRIBULUS CISTOIDES L.

By Ether K. Allen and O. N. Allen; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 179-183. 1950.

This paper is a histological study of the nodular swellings found on the roots of Tribulus cistoides L., an xerophytic nonleguminous plant. No evidence was obtained to indicate that these swellings are caused by microorganisms. Anatomically the nodular swellings found on this species show neither significant nor superficial similarities to the tissue pattern of leguminous nodules. The cytology of the proliferated tissue is described. Because these swellings lack evidence of infection, do not contain microorganisms at any stage of development, and apparently serve only a accessory starch storage areas, it is concluded that the term "nodules" for these swellings is unwarranted.

- - - - - - - -

EFFECT OF SOIL FUNGI ON GERMINATION OF SWEET ORANGE SEEDS AND DEVELOPMENT OF THE YOUNG SEEDLINGS.

By James P. Martin; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 184-188. 1950.

The growth of citrus in some soils makes them a less favorable medium for subsequent growth of the same crop. The feeder roots of citrus trees or seedlings grown in such soils show considerable decay.

Certain fungi, primarily Fusarium solani,

Pyrenochaeta sp., and Fungus D1, were found in greater concentration in old citrus soils than in adjacent soils never before cropped to citrus. Sterile culture technique and a sand medium were used in a study to determine the effect of these and other soil fungi found in the root zone of citrus trees, on germination of sweet orange seeds and development of the young seedlings.

- - - - - - - -

SOME EFFECTS OF STREPTOMYCES ALBUS AND PENICILLIUM SPP. ON RHIZOBIUM MELILOTI.

By Geo. D. Thornton, Jose de Alencar, and F. B. Smith; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 188-191. 1950.

A study of the association of several soil microorganisms and Rhizobium meliloti was made in culture media and in sterilized soil. Seven cultures of actinomycetes belonging to the genus Streptomyces and six cultures of fungi belonging to the genus Penicillium were isolated from soil taken from the roots of sweet clover plants. Six of the streptomyces cultures and two of the fungal cultures showed antibiotic properties toward Rh. meliloti in studies employing the agar plate technique.

- - - - - - - -

INOCULATION OF CRIMSON CLOVER (TRIFOLIUM INCARNATUM L.) WITH MIXTURES OF RHIZOBIA STRAINS.

By Joe C. Burton and O. N. Allen; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 191-195. 1950.

Crimson clover which received only effective rhizobia showed the best growth and the highest content of nitrogen. The efficiency of a mixture of effective strains was only slightly superior to that of a single effective strain when each inoculum was added at the time of planting.

Clover plants which were initially inoculated with ineffective rhizobia at the time of planting followed by a second inoculation with effective strains after either 1 or 2 months showed little, if any, benefit from the latter. Similar results were obtained when the inoculants were applied in reverse order.

Crimson clover plants inoculated with mixtures of effective and ineffective strains at planting bore more nodules produced by the ineffective than by the effective strains. Nodules produced by both types occurred throughout the root system.

Time of harvest was an important factor in evaluating the benefit obtained from inoculation with mixed cultures of rhizobia.

- - - - - - - -

STUBBLE MULCH STUDIES: III. INFLUENCE OF SOIL MICROORGANISMS AND CROP RESIDUES ON THE GERMINATION, GROWTH AND DIRECTION OF ROOT GROWTH OF CORN SEEDLINGS.

By T. M. McCalla and F. L. Duley; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 196-199. 1950.

A laboratory study of some factors involved in stubble-mulch farming that reduce germination and growth of corn seedlings was made. Corn germination in soil mulched with wheat straw was less than in bare soil even though both test soils were maintained in an excessively wet condition.

It was found that a mineral agar medium containing a source of organic nitrogen stimulated the growth of soil microorganisms which caused the roots of corn seedlings to grow upward. Kernels of corn soaked in a plant material-water mixture for 24 to 48 hours, and then placed on an agar medium usually gave seedlings with a small percent of their roots growing upward. When organic nitrogen compounds were added to a mineral nutrient agar they stimulated the production of substances by microorganisms which caused a high percentage of the seedling roots to turn upward. The growth of these seedlings was greatly reduced as compared to the seedlings in the control. Germination was reduced with water extracts of sweetclover and wheat straw plus 0.5 percent ammonium nitrate. The compounds containing organic nitrogen reduced germination only slightly even though in most cases the sprouted kernels made very little growth.

- - - - - - - -

THE OCCURRENCE OF AEROBIC MESOPHILIC SPOREFORMING BACTERIA ON PLANT ROOTS.

By Francis E. Clark and D. H. Smith; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 199-202. 1950.

The Bacillus flora encountered in soil and on the roots of greenhouse-grown plants is reported. Bacillus cereus, B. megatherium, and B. subtilis were commonly encountered in soil, and these species were also found associated with plant roots. B. circulans, B. brevis, and B. polymyxa were found relatively more numerous, insofar as sporulating bacteria were concerned, on plant roots than in the soil. Under certain conditions of plant growth, these species became the dominant sporeformers in the rhizoplane. Bacteria with round spores were rarely isolated from plant roots, but were observed to become dominant in a laboratory soil to which peptone had been added.

- - - - - - - -

THE ORGANIC MATTER AND NITROGEN CONTENT AND CARBON-NITROGEN RATIO OF CECIL SOIL AS INFLUENCED

BY DIFFERENT CROPPING SYSTEMS ON CLASS II, III, AND IV LAND.

By G. W. Gosdin, Matthias Stelly, and W. E. Adams; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 203-208. 1950.

The objectives of this investigation were to obtain information on the relative effect which (a) various cropping practices on any one class of land, (b) any one cropping system on different classes of land, and (c) crop utilization had on the organic matter and nitrogen content and carbon-nitrogen ratio of the soil.

It was found that cropping to continuous cotton resulted in losses of organic matter and nitrogen on Classes II and III land but in no change on Class IV land where the 1943 content was extremely low. Rotation 10 on Class II and III land and rotation 14 on Class II land approximately maintained the organic matter and nitrogen content of the soil. All other rotations studied resulted in increases on the class of land on which they occurred. Rotations which appeared on both Classes II and III land resulted in greater gains on Class III land whereas rotations occurring on Classes III and IV land normally were equally efficient on both classes.

Usually, as the proportion of row crops decreased and the legume plus small grain crops increased, the returns of organic matter and nitrogen became greater. The greatest gains were obtained with rotations 19 and 25 which included kudzu nearly continuously and perennial lespedeza, respectively.

- - - - - - - -

ESTIMATING THE NITROGEN DELIVERY OF SOIL FROM THE ORGANIC MATTER DETERMINATION AS REFLECTED BY SANBORN FIELD.

By C. M. Woodruff; Proc. Soil Sci. Soc. of Amer. Vol. 14, pp. 208-212. 1950.

Results from the plots of Sanborn Field at Columbia, Mo., have been used to evaluate the average annual delivery of nitrogen from the soil to the crop as a function of the amount of nitrogen in the soil and of the kind of crop. The results show that on the average the annual rate of delivery of nitrogen was 2 percent for corn, 1 percent for small grain, and 3/4 percent for a crop of nonleguminous meadow. The effective amount of nitrogen present in 6 tons per acre of manure was 16 pounds and 1 3/4 ton crop of red clover contributed through the stubble residue about 38 pounds of nitrogen for the following crop of corn.

The amounts of nitrogen required to produce a bushel of grain, including the forage associated with the grain, were 2.0 pounds per bushels of corn, 2.2 pounds per bushels of wheat, and 0.92 pounds per bushel of oats. The above results provide a basis for estimating the amounts of nitrogen fertilizer required to produce a crop of desired yield on a soil for which the organic matter content is known.

The results also show that insofar as the changes in the nitrogen content of the soil are concerned there is no significant difference between continuous cropping and rotation cropping as long as the acreages of the different crops in the two systems are the same. An annual accretion to the soil of 20 pounds of nitrogen per acre occurred for all crops studied, including corn on the Morrow Plots at Urbana, Ill. This value and the rates of delivery of nitrogen from the organic matter under different crops establish the equilibrium levels of nitrogen which soils will approach for a given system of cropping where all the crop is removed from the land.

- - - - - - - -

WOOD WASTE LIGNINS TO PRODUCE SOIL ORGANIC MATTER OF A STABLE NATURE.

By J. R. Neller and W. H. Kelly; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 212-215. 1950.

The results show that the organic matter content of soils can be increased by means of waste wood lignins and that this organic matter is, by virtue of its high content of lignin, quite stable even though the temperatures, moisture, and aeration conditions are conducive to loss by oxidation throughout most of the year.

These lysimeter and greenhouse experiments indicate that under proper soil management in the use of lime, lignin treated soils may have an increased productivity. Besides the organic matter effect a benefit may result from the moisture holding properties of the calcium ligno sulfonate soil complex.

Of particular interest is the retarding effect that the neutral and neutralized wood waste lignin treatments have on the loss by leaching of fertilizer phosphate from some of these sandy soils.

- - - - - - - -

THE EFFECT OF NITROGENOUS FERTILIZERS APPLIED TO SOIL ON THE FORMATION OF NITRATES, THE AVAILABILITY OF PHOSPHATES, AND SOIL REACTION.

By W. O. Trogdon and G. W. Volk; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 216-220. 1950.

The purpose of this investigation was to study the effects of the physiological reaction of two complete fertilizers, when concentrated in bands,

on various soil factors and the yield of corn. One fertilizer contained Cyanamid as the base forming source of nitrogen and the other contained ammonium sulfate as the acid forming source of nitrogen.

- - - - - - - -

THE EFFECT OF VARIOUS AMOUNTS OF NITROGEN, PHOSPHORIC ACID, AND POTASH ON THE YIELDS OF SILAGE CORN.

By T. E. Odland and H. G. Allbritten; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 221-223. 1950.

Different amounts of nitrogen, phosphoric acid, and potash were used in fertilizers applied to two varieties of corn harvested for silage at the Rhode Island Experiment Station. One variety, West Branch Sweepstakes, is an open-pollinated type while the other, Ohio K-24 is a hybrid. The levels of nitrogen were 40, 60, 80, and 100 pounds per acre. Phosphoric acid and potash levels were 60, 120 and 180 pounds per acre. Various combinations of these levels were made to provide 24 different grades of fertilizers. The fertilizer was applied in bands at the time of planting. Yields were obtained over a 3-year period, 1945-47.

The results were considerably influenced by the weather conditions. A dry spell during the summer of 1945 adversely affected the yields of West Branch Sweepstakes more than it did the Ohio K-24. In 1946 and 1947, with a few exceptions, there were consistent responses to increasing amounts of all three elements on both varieties. The greatest response was to increases in nitrogen.

For silage corn grown under similar conditions, a fertilizer is suggested supplying 80 pounds of nitrogen and 120 pounds each of phosphoric acid and potash per acre.

- - - - - - - -

PRELIMINARY REPORT OF THE YEAST FERMENTATIVE PROCEDURE FOR THE ESTIMATION OF AVAILABLE SOIL NITROGEN AND GENERAL FERTILITY LEVEL.

By A.C. Richer and F. J. Holben; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 223-225. 1950.

A yeast fermentative procedure was developed which yielded highly significant correlations with crop yields and nitrifying capacity, using 36 soils from the Jordan Soil Fertility Plots. The method was rapid and it was suggested as a possible substitute for the long nitrification procedure usually employed to estimate the ability of soil to supply available nitrogen.

- - - - - - - -

ROCK PHOSPHATE STUDIES WITH NEUTRON IRRADIATED ROCK PHOSPHATE.

By Maurice Fried and Arnold J. MacKenzie; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 226-231. 1950.

This investigation considers the effect of soil pH, rate of application, and crops, on the plant utilization of phosphorus and calcium from rock phosphate and superphosphate. Tracer techniques were extended to these studies by using neutron irradiated rock phosphate.

With rock phosphate, the higher the soil pH, the lower the relative amounts of fertilizer to soil phosphorus absorbed by plants. With superphosphate, soil pH did not influence this relative uptake. At pH 5.8, plant removal of phosphorus from superphosphate equaled or exceeded removal from rock phosphate even when the latter material was applied at four times the P_2O_5 rate. The percent phosphorus in the plant derived from rock phosphate was the same order of magnitude in the three crops, vetch, alfalfa, and ryegrass. The total uptake of phosphorus from rock phosphate was as much as 16.4 times that of calcium.

- - - - - - - -

UTILIZATION OF FERTILIZER AND SOIL PHOSPHORUS BY SOYBEANS.

By C. D. Welch, N. S. Hall, and W. L. Nelson; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 231-235. 1950.

The utilization of fertilizer and soil phosphorus was studied using the radioactive tracer techniques. In 1948 soybeans were grown at two levels of soil phosphorus with applications of 25 and 100 pounds per acre of P_2O_5 in bands. Band and broadcast methods of placement of phosphorus were compared in 1949. Also in 1949 soybeans were planted as a second crop after Irish potatoes to which applications of phosphorus had been made.

The percentage of the phosphorus in the plant derived from the fertilizer was inversely related to the level of soil phosphorus, and directly related to the rate of application. The total uptake of phosphorus was greater from the high phosphorus soil.

Early absorption of phosphorus was much higher when the phosphorus was placed in bands than when it was broadcast and disced into the soil.

Phosphorus applied to an early crop of potatoes was readily available to a second crop of soybeans. Thirty days after planting 96 percent of the phosphorus in the soybean plants was derived from phosphorus fertilizer applied to the previous crop of Irish potatoes at the rate of 500 pounds per acre.

Increased production of dry matter and in some instances of seed yields were brought about by applications of phosphorus.

- - - - - - - -

APPLICATION OF SOIL TESTS, TISSUE TESTS, AND FOLIAR ANALYSIS TO FIELD EXPERIMENTS.

By J. Q. Lynd, L. M. Turk, and R. L. Cook; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 236-241. 1950.

This study was undertaken to investigate certain chemical changes that may have taken place in a Brookston soil following 7 years of continuous fertilizer and rotation experiments. Tissue tests and foliar analyses were carried out on the corn crop in these experiments during two growing seasons, 1947 and 1948, to determine the nutrient status of the corn plants as affected by the experimental treatments.

Analysis of soil samples taken from the fertilizer-rotation field experiments at the beginning and after 7 years of continuous experimental treatment did not show differences sufficiently great to account for the differences in corn yields.

Tissue tests throughout two growing seasons on these fertilizer-rotation field experiments indicated that nitrogen is the limiting factor in plant growth and that a definite change took place in the nitrogen status of plants with the initiation of the flowering period.

Foliar analysis for total nitrogen in leaf samples taken during the flowering period indicated positive correlation with corn yields.

It is proposed in this investigation that plant tissue testing be utilized for determining the period of sampling for foliar analysis, for indicating possible limiting factors in plant growth, and for substantiating the interpretation of results from foliar analysis.

- - - - - - - -

THE EFFECTS OF FERTILIZER TREATMENTS UPON YIELD AND COMPOSITION OF WHEAT FORAGE.

By J. C. Smith, L. C. Kapp, and R. C. Potts; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 241-245. 1950.

In the work reported here, fertilizer experiments with wheat were started in the fall of 1948 on areas of Norwood silt loam, a Brazos River bottom soil, and of Lufkin fine sandy loam, an upland soil located near College Station, Tex. The objectives were to study the differential responses in yield and quality of forage grown on these two quite different soils with varied amounts of N, P_2O_5, and K_2O.

CORRELATION OF THE POTASSIUM CONTENT OF ALFALFA WITH THAT AVAILABLE IN SOILS.

By W. A. Seay, O. J. Attoe, and E. Truog; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 245-249. 1950.

A linear relation was found to exist between the percentage of potassium contained in alfalfa and the logarithm of the number of pounds of exchangeable potassium per acre in the soil on which the crop was grown. In the case of Almena, Antigo, and Spencer silt loams, which are quite similar as regards their chemical and physical properties, the relation is expressed by the following equation: Percentage of K in crop = 1.81 log lbs. exch. K per acre - 2.84. The coefficient of correlation is 0.81 and the standard error of estimate is 0.23 percent K. A similar relationship was found to hold with the data given in the literature for alfalfa grown in the field and in sand cultures.

- - - - - - - -

CORRELATION OF YIELD AND QUALITY OF ALFALFA AND CLOVER HAY WITH LEVELS OF AVAILABLE PHOSPHORUS AND POTASSIUM.

By O. J. Attoe and E. Truog; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 249-253. 1950.

Experiments were conducted on Spencer and Antigo silt loams in northwestern Wisconsin during 1943-48, inclusive, to determine how varicus levels of available phosphorus and potassium in the soil affect the yields of crops in a rotation of corn, oats, and 2 years of hay (alfalfa-clover-timothy). Because of frequent failure and low yields of alfalfa and clover in this area, special attention was given to the relation of levels of available phosphorus and potassium to the yield and survival of these crops.

- - - - - - - -

DIFFERENTIAL RESPONSE OF SNAPBEANS, CRIMSON CLOVER AND TURNIPS TO VARYING RATES OF CALCIUM AND SODIUM BORATE ON THREE SOIL TYPES.

By N. R. Page and W. R. Paden; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 253-257. 1950.

In view of the narrow range between boron toxicity and deficiency, it seemed advisable to study the effect of this difference in the rate of availability of the boron contained in Colemanite and Rasorite on the yield response of several crops that are known to vary in their sensitivity to this element. A greenhouse pot culture experiment was designed in an attempt to determine the number of pounds per acre of the two compounds that could be added to three selected soil types without producing a significant decrease in the yields of snapbeans, crimson clover, and turnips.

BORON UPTAKE BY PLANTS AS INFLUENCED BY SOIL MOISTURE.

By J. A. Hobbs and B. R. Bertramson; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 257-261. 1950.

Two greenhouse experiments using tomato plants were set up to study the effect of dry soil conditions on the uptake of boron by plants. The root systems of the experimental plants were split longitudinally. One portion of the root system of each plant was placed in surface soil, while the other portion was placed in subsoil material. Various moisture conditions were maintained in the surface soils, but the subsoil was kept moist at all times.

The results of these experiments showed that fast-growing tomato plants were not able to obtain enough boron from a dry surface soil to maintain normal development, even though adequate moisture was available in the subsoil. This suggested that plants growing on soils with dry surface layers might become deficient in boron, if the more moist subsurface layers did not contain sufficient available boron for normal growth. This may explain why alfalfa plants exhibit boron-deficiency symptoms on some Indiana soils in dry summers, but rarely show these same symptons in seasons of greater rainfall. Therefore, it may be true in Indiana that the boron-deficiency symptoms, which have been observed in alfalfa, result from a deficient supply of moisture in the soil, not from a deficient supply of boron.

- - - - - - - -

A LYSIMETER INVESTIGATION OF GAINS, LOSSES, AND BALANCE OF SALTS AND PLANT NUTRIENTS IN AN IRRIGATED SOIL.

By F. E. Broadbent and H. D. Chapman; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 261-269. 1950.

Gains, losses, and balance data for plant nutrients and salts, obtained from a 15-year lysimeter investigation, are presented. Gains due to additions of fertilizer and irrigation water were determined, and losses due to leaching and crop removal evaluated. In the case of nitrogen, soil analyses were also made.

- - - - - - - -

POPULATION DENSITY OF UNIRRIGATED MAIZE AND ITS INFLUENCE UPON FERTILIZER EFFICIENCY IN CENTRAL MEXICO.

By Eilif V. Miller, John B. Pitner, Ricardo Villa J., and Carlos Romo G.; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 270-275. 1950.

Population density of corn measured in Mexican farmers' fields varies from 8,000 to 20,000 plants per acre. Highest populations occur in cool mountain areas. Fertilizer response in farmers' fields is closely related to adequacy of rainfall in August and September. The most efficient fertilizer application tested is 17.8 pounds per acre of N from ammonium sulfate. Higher rates of N are more efficient when phosphorus is applied.

- - - - - - - -

SOME EFFECTS OF SALT WATER ON SOIL FERTILITY.

By M. J. Plice; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 275-278. 1950.

Salt (sodium chloride) injures soil by dispersing it, at the same time causing organic matter and exchangeable material to be lost. The extent of the damage it does is not entirely proportional to the amount of salt present. The maximum physical injury done to soils seems to occur at the time the soil again has about the same amount of total sodium it originally had, or even less. Injured soils can be restored to excellent friability by gypsum. The mechanism of improvement is largely mechanical and not chemical. The addition of organic matter increases such improvement.

- - - - - - - -

KEEP CROP RESIDUES ON SURFACE OF GROUND.

By J. H. Stallings; Better Crops with Plant Food, Vol. 34, No. 8, pp. 9-16. October 1950.

The data presented here indicate that the most effective way to utilize crop residues and other vegetal covers is to keep them on the surface of the ground, rather than turn them under. The data also show that the proper use of these materials offers the most effective single measure of reducing erosion and runoff and bringing about other desirable conditions in cultivated soils leading to continued high production.

Crop residues and other vegetal covers are more effective in building up the organic matter content of the soil when left on the surface than when turned under. They are also more effective in improving the aggregate structure and infiltration capacity of the soil when left on the surface. Surface utilization of these materials led to substantial increases in crop yields in many instances. Further investigation doubtless will reveal satisfactory methods of overcoming the depressing effects of mulch covers on crop yields, where they occur, and lead to even greater increases under those conditions producing superior yields now. They offer an exceptional opportunity for bridging the gaps existing in crop rotations where the covers from the rotation crops themselves do not furnish adequate protection from the destructive action of the falling raindrop.

The chief function of crop residues and other vegetal covers in reducing erosion is energy absorption or protection from raindrop impact and not the impediment of overland flow. When left on the surface, vegetal covers deenergize the falling raindrop, thereby eliminating the destructive action of raindrop splash. This in turn prevents the chain of damaging reactions which the splashing raindrop sets in motion. To be sure, we do not have the final answer or answers to the correct use of crop residues, or of other vegetal covers, in this capacity. We do have enough information, however, to indicate that these hold the key to the erosion control problem on cultivated land.

- - - - - - - -

BURY THE LINING.

By Jewell R. Benson; The Reclamation Era, Vol. 36, No. 10, pp. 185-186 and 203. October 1950.

A new type of lining, a buried asphalt membrane, should play an important part in solving the problem of lining canals and laterals at a reasonable cost. The asphalt membrane is placed directly on the subgrade - the only preparation necessary is smoothing the bottom and sides of the canal. Cover the membrane with enough earth to hold it in place, protect it from livestock, and reduce weathering. This lining is comparatively cheap, costing about 70 cents per square yard, including subgrade preparation and can be constructed in practically any kind of weather.

- - - - - - - -

THE DAWSON PLANTING TOOL.

By Louis Temple; The Reclamation Era, Vol. 36, No. 10, pp. 187 and 197. October 1950.

The Dawson planting tool was designed for the purpose of planting tree seedlings on steep slopes. It consists of a T-shaped tube with a sharp steel point and a stirrup 12 inches from the point to force the tool into the ground.

In use, the Dawson tool makes a round hole in the ground with firm sidewalls without disturbing the ground around the hole. This conserves moisture and reduces further erosion around the seedlings on steep slopes. The soil around seedlings, newly planted by the Dawson-tool method, is easily firmed in around the roots, thus preventing air pockets which would in time result in the death of the seedlings. It also eliminates the planter's temptation to make shallow holes and jam the seedling into the ground leaving U-shaped roots which in turn yield unhealthy trees.

- - - - - - - -

GETTING THE EVIDENCE ON EVAPORATION.

The Reclamation Era, Vol. 36, No. 10, pp. 192-196. October 1950.

Evaporation has been charged with the crime of stealing more than 800,000 acre-feet per year, or 260 trillion gallons of water from Lake Mead, the reservoir backed up by the Hoover Dam. It has been estimated that evaporation is capable of stealing more than 2,000,000 acre-feet of water a year from present and proposed reservoirs in the Colorado River Basin, and channels in the lower part of the basin. This would be enough water to irrigate 400,000 acres or provide 2 billion kilawatt-hours of hydroelectric power a year, enough to serve a community like Oklahoma City for more than 2 years.

A project has been setup at Oklahoma City's Lake Hefner to determine evaporation losses from lakes and reservoirs. Four methods are being used in gathering evaporation data. They are the "water budget", the "indirect", the "energy budget" and the "mass transfer" methods.

- - - - - - - -

ELECTRO-CHEMICAL PROPERTIES OF GROUND WATER IN MAJOR TYPES OF WISCONSIN ORGANIC SOILS.

By S. A. Wilde, John Trach, and S. F. Peterson; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 279-281. 1950.

This paper reports the results of analyses of ground waters in four major types of Wisconsin organic soils: moss peat, wood peat, sedge peat, and muck.

- - - - - - - -

LIQUID AMMONIA TREATMENTS OF COMPOSTED FERTILIZERS.

By G. K. Voigt, W. H. Brener and S. A. Wilde; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 281-283. 1950.

In order to determine the penetrating capacity of liquid ammonia, fresh compost was placed in a wooden box, 3 by 3 by 1 1/2 feet, and different amounts of ammonia were injected in the middle of the sample using a hollow pointed thrusting rod.

- - - - - - - -

DRAINAGE DITCHBANK STABILIZATION FOR ORGANIC SOILS.

By J. F. Davis and C. M. Harrison; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 283-285. 1950.

Sixteen grasses and legumes were planted on a

ditch bank as a possible means of stabilizing it. It was observed that a well established grass cover practically prevented filling the ditch with muck through wind action. Approximately 25 percent of the ditch capacity was filled with muck on those areas not protected with grass.

The following criteria are presented for an ideal grass for spoil bank plantings on organic soils: winter hardiness, low growing, root system capable of holding soil from eroding, growth maintained to water's edge but not persisting under wet conditions, and maintenance of a green succulent growth to reduce the danger of fire hazard resulting from accumulated mature herbage.

- - - - - - - - -

SOME PHYSICAL CHANGES ACCOMPANYING PRAIRIE, WIESENBODEN AND PLANOSOL SOIL PROFILE DEVELOPMENT FROM PEORIAN LOESS IN SOUTHWESTERN IOWA.

By Rudolph Ulrich; Proc. Soil Sci. Soc. of Amer. Vol. 14, pp. 287-295. 1950.

The purpose of the studies undertaken was to investigate the existence of functional relationships between various physical properties of the nearly level Prairie, Wiesenboden, and Planosol loess-derived soils and the distribution of Peorian, or Wisconsin, loess of Southwestern Iowa.

- - - - - - - - -

SOME SOIL CATENA RELATIONSHIPS IN SALINE COUNTY, KANSAS.

By Paul L. Brown and R. V. Olson; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 296-299. 1950.

Laboratory studies were made on three of the major soil catenas in Saline County, Kans., During the progress of the detailed soil survey. The determinations included pH, readily soluble phosphorus, Bouyoucos hydrometer mechanical analysis, and total nitrogen on all genetic horizons and exchange capacity, exchangeable calcium, magnesium, and potassium on the A_1 horizons.

- - - - - - - - -

THE PLAGIOCLASE FELDSPARS AS AN INDEX TO SOIL WEATHERING.

By E. R. Graham; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 300-302. 1950.

The weathering rates of plagioclase feldspars followed the calcium content of the minerals. Anorthite, the highest calcium mineral, weathered the most rapidly, the others following in sequence.

Albite was little affected by the action of hydrogen clay; therefore, it can be considered extremely resistant to weathering action. Bytownite and laboradorite released significant quantities of both calcium and sodium during the short weathering period of 100 days.

- - - - - - - - -

THE VARIABILITY OF SOIL PROPERTIES IN RELATION TO STAGE OF PROFILE DEVELOPMENT.

By Frank F. Harradine; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 302-311. 1950.

A statistical analysis of variance of soil properties was made from physical and chemical measurements of four soil series that were selected to represent four distinct stages of profile development. Samples from 16 profiles of each series were collected at random from Colusa County, Calif. All samples were taken from cultivated areas. The physical properties analyzed were color, texture, apparent density, and moisture equivalent, and the chemical analyses included pH, organic carbon, total nitrogen, and available phosphorus.

The experimental results and statistics of the study showed that in the main recent soils varied in their characteristics to a greater degree than did the more mature soils. A good correlation between decreasing variability with increasing maturity was obtained from the measurements of apparent density, colloidal clay content, pH, and total nitrogen. Other properties exhibited greater variance in some instances but a significant trend was always indicated.

- - - - - - - - -

ON THE ORIGIN OF GUMBOTIL.

By Yi Hseung, C. E. Marshall, and H. H. Krusekopf; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 311-315. 1950.

Mineralogical and mechanical studies were made of two sections of loess, gumbotil and till, near Columbia, Mo. The gumbotil contains more clay, more light minerals, but a lower content of heavy minerals than the underlying oxidized till. For the heavy minerals in the gumbotil, there is an increase in tourmaline and epidote and a marked decrease in hornblende and tremolite, as compared with till. The sharp differences in the mechanical composition, and in the distribution and percentage of the heavy and light minerals, indicate that the gumbotil is not a pedogenic horizon in the weathered till section, but that it was formed as a water deposit of highly weathered clay derived from till.

- - - - - - - - -

GENESIS AND CLASSIFICATION OF RED-YELLOW PODZOLIC SOILS.

By Roy W. Simonson; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 316-319. 1950.

It is postulated in this paper that the dominant processes in Red-Yellow Podzolic soils are the formation of silicate clay minerals at great depth and their subsequent destruction and gradual disappearance in the solum. This hypothesis is based on published data for distribution and mineral composition of the clay fraction in many Red-Yellow Podzolic profiles. It is believed that clay minerals tend to disappear with time in the solums of Red-Yellow Podzolic soils, where as they tend to accumulate in the solums of Gray-Brown Podzolic soils. This is proposed as a theoretical basis for distinguishing the Red-Yellow Podzolic and Gray-Brown Podzolic soils. The point at which curves representing formation and destruction of clay minerals within the solum intersect is suggested as the boundary between the two groups of soils.

- - - - - - - -

TRENDS IN SOIL CLASSIFICATION AND CORRELATION AT THE SERIES LEVEL.

By J. Kenneth Ableiter; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 320-322. 1950.

Greater significance is now being attached to the physical, chemical and mineralogical character of the solum and of the underlying material than was done in the early days. This results in narrowing the range of some series and the consequent recognition of more soil series. At the same time, however, every effort consistent with the concept of the genetic profile is being made to limit the number of series and maintain the category at an appropriate level of abstraction.

- - - - - - - -

SOIL SURVEY DATA AS A BASIS FOR THE ASSESSMENT OF IRRIGATION DISTRICT LANDS.

By R. Earl Storie and Frank Harradine; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 327-329. 1950.

Soils information secured in a standard basic soil survey is used as a basis for the assessment of land taxes in an irrigation district where taxes are assessed directly against the land and its productive value.

- - - - - - - -

RELATION OF SOIL FERTILITY AND RATE OF GROWTH OF MIXED OAK STANDS IN THE DRIFTLESS AREA OF SOUTHWESTERN WISCONSIN.

By C. T. Youngberg and H. F. Scholz; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 331-332. 1950.

The study suggested that in silvicultural investigations or soil productivity reasonably reliable data can be obtained by using the recently developed techniques for rapid determination of the following three factors: soil reaction, content of organic matter, and base exchange capacity. The content of total replaceable bases may be easily arrived at from the values for base exchange capacity and soil reaction by the use of a specially constructed diagram.

- - - - - - - -

CORRELATION BETWEEN CERTAIN SOIL CHARACTERISTICS AND SITE FOR DOUGLAS-FIR IN NORTHWESTERN WASHINGTON.

By Stanley P. Gessel; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 333-337. 1950.

A forest soil-site survey in Northwestern Washington during the summer of 1949 indicated that productivity of land for Douglas-fir growth could be predicted from soils information. Site index on all soils examined increased with change in texture from coarse to light to medium. Heavy textured soils were not included in the study. Medium textured soils of different profile groups did not differ significantly in site index. Depth of soil was an important factor for those soils underlain by a hardpan or by bedrock.

Site index on the same soil profile and texture group was related to mean annual precipitation. Site index on (1) soils increases with increasing precipitation up to 40 inches. Above this amount of rainfall site index decreased for coarse, fine, and medium textured soils. Site index on soils underlain by an impeding layer increased with precipitation up to 60 inches. The greatest increase was up to 40 inches and above this amount the change in site index was small.

- - - - - - - -

OXIDATION-REDUCTION POTENTIAL AS A CHARACTERISTIC OF FOREST HUMUS TYPES.

By Andre LaFond; Proc. Soil Sci.Soc. of Amer., Vol. 14, pp. 337-340. 1950.

Investigations suggested the existence of marked differences between the oxidation-reduction potential of freshly collected samples of mull and mor humus types. The lack of correlation between the level of the oxidation-reduction potential and the pH value of samples is of particular significance. As a rule, mull humus showed a positive redox potential in spite of strong acidity, and mor humus showed a negative potential in spite of mild acidity. The transitional type of duff mull, formed in part by free organic

matter and in part by incorporated humus, exhibited variable characteristics although only the organic fraction (F + H subhorizons) of this type was analyzed. Periodic determination of oxidation-reduction potential of fermented humus samples, as well as potentiometric titration, suggested radically different behavior of the two main types of humus. It is believed, therefore, that oxidation-reduction characteristics may serve as a criterion in classification of forest humus.

- - - - - - - -

SOME EFFECTS OF MYCORRHIZAE ON THE PHOSPHORUS NUTRITION OF MONTEREY PINE SEEDLINGS.

By Earl L. Stone, Jr.; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 340-345. 1950.

Pot culture studies with Monterey pine grown in a synthetic soil containing ground phosphatic minerals failed to demonstrate any effect of mycorrhizae on phosphorus uptake by the seedlings. Similar cultures of pine in O'Neill sandy loam and Carrington silt loam showed that mycorrhizal infection was followed by accumulation of phosphorus by the plant and resumption of normal growth. Nonmycorrhizal seedlings failed to accumulate any considerable quantity of phosphorus for untreated soils but, on the Carrington soil, grew satisfactorily when phosphate fertilizers were supplied. It is concluded that at least much of the mycorrhizal response in pine can be attributed to improved phosphorus nutrition.

- - - - - - - -

GROWTH OF TREMBLING ASPEN IN RELATION TO GROUND WATER AND SOIL ORGANIC MATTER.

By S. A. Wilde and D. T. Pronin; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 345-347. 1950.

An attempt to express in concrete figures a correlation between the rate of growth of trembling aspen, content of soil organic matter, and depth to the ground water table was made during the summer of 1947. The rate of growth of trembling aspen was determined on 22 sample plots varying in size from 1/5 to 1/2 of an acre. The age of the aspen stands ranged from 22 to 27 years. The present and the expected yields were determined on the basis of available tables. The depth to the upper limits of the deoxidized zone (gley horizon), indicating the prevailing position of the ground water table, was established on each sample plot. Samples were collected from the 7-inch surface layer of soil by means of a sampling tube and were analyzed for their content of organic matter, using a rapid colorimetric procedure.

- - - - - - - -

STRUCTURE IMPROVEMENT FOLLOWING LEGUME GROWTH ON UNFERTILIZED SUBSOIL.

By P. W. Fletcher and R. B. Livingston; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 347-350. 1950.

This paper is a progress report of a continuing study, comparing the physical character of an eroded soil profile under Lespedeza sericea Benth. with that of an adjacent bare area.

- - - - - - - -

EFFECT OF SOIL ON THE DEVELOPMENT OF HARDWOOD UNDERSTORIES IN PINE STANDS OF THE PIEDMONT PLATEAU.

By T. S. Coile; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 350-352. 1950.

The purpose of this study was to determine the relationship between soil features and the species composition and density of hardwood understories in pine stands.

- - - - - - - -

HYDROLOGIC CHARACTERISTICS OF SOUTH CAROLINA PIEDMONT FOREST SOILS.

By Marvin D. Hoover; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 353-358. 1950.

The purpose of this study was to determine the changes in soil hydrology resulting from severe erosion.

- - - - - - - -

RELATION OF PERCOLATION RATES THROUGH SATURATED SOIL CORES TO VOLUME OF PORES DRAINED IN 15 AND 30 MINUTES UNDER 60 CENTIMETERS TENSION.

By T. C. Peele; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 359-361. 1950.

It is the purpose of this paper to show the relation of pore volume drained in 15 minutes under 60 centimeters tension to percolation rates under unit head. Determinations of the relation of pore volume drained in 15 minutes to pore volume drained in 30 minutes under 60 centimeters tension were made on a number of cores to provide a basis for converting the 15-minute values to 30-minute values and for estimating percolation rates from 30-minute pore drainage values.

- - - - - - - -

PHYSICAL PROPERTIES OF SOILS AS MODIFIED BY CROPS AND MANAGEMENT.

By R. E. Uhland; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 361-366. 1950.

This report gives results showing the effects of some of the major crops and management practices on the percolation or transmission rate, volume weight, stability of aggregates, and volume of pores drained on natural soil cores. These soil cores were taken from a number of locations in Missouri, Illinois, Ohio, Georgia and California. Data are given on both cores with field moisture as they were taken into the laboratory and also on the same cores after remaining in water overnight.

- - - - - - - -

MARCH OF WATER-STABLE AGGREGATION WITH RELATION TO INITIAL SOIL PARTICLE SIZE.

By D. S. Hubbell and J. L. Gardner; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 367-370. 1950.

March of aggregation was followed for 14 months in soil samples of three initial particle sizes incubated at 26° C. The soil used was Gila clay. The initial particle sizes were (a) 2.38-mm to 4-mm, (b) 1.19-mm to 2.38-mm, and (c) less than 0.12-mm. The first two were obtained by crushing a bulk sample through the larger screen of the pair and using the part caught on the smaller; the last, by grinding a bulk sample to pass through the 0.12-mm screen.

Fluctuations of total aggregation with time were significant. Total aggregation in the larger particle sizes was similar but with some statistically significant differences. In the ground soil, it was always significantly less than in the other two, except in the 3-month determination; and the aggregates were abnormal.

Distribution of aggregates among the aggregate size classes was different in each of the three kinds of samples, but with very few exceptions was remarkably similar in each kind with time.

- - - - - - - -

SOME PHYSICAL AND CHEMICAL PROPERTIES OF SIX VIRGIN AND SIX CULTIVATED IOWA SOILS.

By M. A. Anderson and G. M. Browning; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 370-374. 1950.

Studies were made of six soils in their virgin and cultivated state. Physical and chemical determinations included permeability, aeration porosity, volume weight, aggregate analysis, total nitrogen, pH, available phosphorus, and exchangeable potassium.

The data indicate that the cultivated soils are less well-aerated, have considerably less stable aggregates, and have lost almost one-third of their original nitrogen in 100 years or less of cultivation and cropping.

The changes from the virgin to cultivated state when considered in total, show that tillage has had an adverse effect on those properties which are associated with good crop production.

- - - - - - - -

SOIL LOSSES AS AFFECTED BY COVER, RAINFALL, AND SLOPE.

By L. E. Gard and C. A. Van Doren; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 374-378. 1950.

This paper is a report of soil losses from various lengths of plots on both 5 and 9 percent slopes. The study was conducted for 7 years during the period 1939-1946. The effect of various crops, rainfall, and slope characteristics on soil losses is discussed briefly.

- - - - - - - -

AN IMPROVED PROCEDURE FOR THE PREPARATION AND INTERPRETATION OF X-RAY ANALYSES OF SOILS BY MEANS OF THE GEIGER COUNTER X-RAY SPECTROMETER.

By Charles D. Jeffries; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 378-379. 1950.

An improved method of preparing X-ray diffraction patterns with the Geiger counter X-ray spectrometer is described.

- - - - - - - -

THE INFLUENCE OF SUPPLEMENTAL IRRIGATION ON CORN YIELDS IN INDIANA.

By O. W. Luetkemeier and Helmut Kohnke; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 379-383. 1950.

The study was aimed at utilizing the reserve water resources for greater crop production in Indiana. The object of these investigations was to increase corn yields through the use of supplemental irrigation. The feasibility of irrigation was studied for different soil types.

- - - - - - - -

RECENT TRENDS IN THE USE OF THE LAND-CAPABILITY CLASSIFICATION.

By R. D. Hockensmith and J. G. Steele; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 383-388. 1950.

Outstanding improvements have been made during the last few years in preparing descriptive legends that accompany the land-capability maps furnished farmers. Easily understandable descriptions of each specific kind of land on each farm, written in nontechnical language, have been of inestimable value in helping farmers understand what conservation treatment is needed and why it is needed.

- - - - - - - -

AUTHOR INDEX

	Page
Aasheim, T. S.	11
Ableiter, J. K.	64
Adams, W. E.	57
Ahlgren, G. H.	16
Ahlgren, H. L.	6, 16
Albrecht, W. A.	5, 7
Alexander, L. T.	16
Alderfer, R. B.	2, 15
Allbritten, H. G.	59
Allen, E. K.	56
Allen, O. N.	56, 57
Allen, P. F.	10
Allison, F. E.	21
Allred, B. W.	9, 30, 35
Alrich, D. G.	34
Anderson, E. R.	18
Anderson, G. R.	13
Anderson, H. O.	1
Anderson, L. J.	18
Anderson, M. A.	66
Anderson, W. R.	40
Atkins, M. D.	5
Atkinson, H. B.	28
Atkinson, W. S.	7
Attoe, O. J.	60
Bachtell, M. A.	19, 40
Bailey, R. Y.	8
Bailey, S. H.	20
Bakken, E. H.	25
Banks, R. B.	40
Barber, S. A.	53
Barnes, O. K.	32, 42
Barnes, W. E.	37
Barrick, E. R.	33
Bartholomew, W. V.	55
Bashore, W. D.	43
Baugh, E. R.	35
Bay, C. E.	6
Bear, F. E.	18, 43
Beater, B. E.	27
Becker, M. E.	31
Beetle, A. A.	42
Bender, C. B.	3
Benson, J. R.	62
Benson, M. A.	24
Bentley, J. R.	46
Bertramson, B. R.	61
Black, C. A.	54
Blaisdell, F. W.	26
Blaisdell, J. P.	46, 47
Blaser, R. E.	9
Bloodgood, D. W.	43
Bloodworth, M. E.	35
Boynton, D.	54
Brady, N. C.	9
Bradshaw, G. B.	31, 38
Brandeberry, J. K.	9
Brassington, J. J.	47
Bremner, J. M.	28
Brener, W. H.	62
Brill, G. D.	10
Broadbent, F. E.	55, 61
Brooks, O. L.	18
Brown, A. L.	32
Brown, I. C.	53
Brown, P. L.	63
Browning, G. M.	26, 66
Brune, G. M.	39
Bull, H.	48
Burton, G. W.	44
Burton, J. C.	57
Bushnell, T. M.	21
Campbell, R. B.	51
Campbell, R. S.	11, 45, 48
Camper, H. M.	54
Carolus, R. L.	17
Case, H. C. M.	49
Cassady, J. T.	45
Cassidy, W. C.	24
Chamblee, D. S.	33
Chang, C. W.	21
Chapline, W. R.	47, 48
Chapman, H. D.	61
Chepil, W. S.	21, 22
Chesnin, L.	36
Childs, E. C.	27
Chohlis, J.	11
Christopher, E. P.	49
Clark, F. E.	57
Clarke, I. D.	7
Cocke, R. P.	54
Coile, T. S.	65
Coleman, N. T.	53
Colvard, D. W.	33
Converse, C. D.	20
Cook, C. W.	22, 41
Cook, R. L.	36, 60
Copley, T. L.	33
Cowley, W. R.	35
Cox, M. B.	19, 36
Crane, L. E.	31
Criddle, W. D.	8, 34
Crowe, C. B.	18
Culley, M.	49
Cumings, G. A.	21
Cunningham, J. B.	29
Dale, T.	5
Daniel, H. A.	19, 36
Darrow, R. A.	13
Davis, J. F.	29, 62
Davis, S.	8
Day, G. M.	10
Dayton, W. A.	47
de Alencar, J.	57
DeFrance, J. A.	49
DeHart, P. H.	3
DeVane, E. H.	44
Dodd, D. R.	2, 4
Donnan, W. W.	31, 38
Donnelly, C. A.	26
Doran, C. W.	45

	Page
Dotzenko, A.	16
Dreibelbis, F. R.	35
Drosdoff, M.	36
Duley, F. L.	57
Dunton, H. L.	3
Dwyer, C. H.	38
Dyal, R. S.	30
Edminster, F. C.	7
Edminster, T. W.	10, 35
Einstein, H. A.	40
Eisenmenger, W. S.	23
Elder, W. C.	13
Eldredge, D. B.	21, 29
Ellison, L.	46
Ellison, W. D.	10, 31
Elwell, H. M.	19, 36
Embleton, T. W.	54
Erdman, L. W.	56
Erickson, L. C.	15
Escoffier, F. F.	39
Evans, C. E.	54
Evans, D. D.	50, 52
Farwell, E. O.	3
Ferrer, R.	25
Ferris, J. G.	22
Finney, G. M.	18
Finnell, H. H.	41
Fisher, C. E.	13
Fitch, H. S.	46
Fleming, H. K.	15
Fletcher, P. W.	65
Forman, J.	26
Frandsen, W. R.	12
Frear, D.E. H.	15
French, G. W.	29
Fried, M.	59
Fukuda, H.	26
Fullmer, F. S.	3
Fuelleman, R. F.	15
Gaines, J. P.	18
Gaiser, R. N.	12
Gard, L. E.	66
Gardner, J. L.	14, 66
Gardner, R.	16
Garman, P.	32
Garrison, G. A.	1, 47
Gaskell, R. E.	40
Gault, H. S.	15
Gee, C. W.	15
Gerdel, R. W.	24
Gessel, S. P.	23, 64
Gibbs, J. A.	7
Gish, N. R.	20
Gjèrtson, J. O.	45
Glendening, G. E.	46, 47
Goring, C. A. I.	55
Gosdin, G. W.	57
Graham, E. R.	63
Greene, G. E.	38
Grigsby, B. H.	3, 17
Grout, R. A.	4

	Page
Hafenrichter, A. L.	9
Hall, N. S.	59
Hamilton, E. L.	23
Hamilton, L. P.	39
Hansen, B. L.	24
Hansen, C. M.	39
Hanson, C. H.	34
Harper, H. J.	12, 13
Harradine, F. F.	63, 64
Harris, L. E.	22
Harrison, C. M.	62
Harrold, L. L.	35
Haynes, J. L.	1, 9, 19
Hays, O. E.	6, 35
Hazen, A. G.	29
Healton, L. H.	51
Hendricks, S. B.	30
Hendrickson, B. H.	6, 7
Heneberry, W. H.	29, 49
Henrie, J. O.	22
Hensill, G. S.	14
Hester, J. B.	8
Hickok, R. B.	29, 35
Hill, R. R.	23
Hobbs, J. A.	61
Hockensmith, R. D.	66
Hodgson, J. M.	3
Holben, F. J.	59
Holmes, R. S.	53
Holtan, H. N.	1, 42
Hoover, C. D.	53
Hoover, M. D.	65
Hopp, H.	7
Hormay, A. L.	46
Houston, C. E.	43
Hseung, Yi.	63
Hubbard, W. A.	38
Hubbell, D. S.	55, 66
Hulbert, W. C.	21
Hull, A. C.	48, 48
Hurd, R. M.	47, 48
Hurd-Karrer, A. M.	37
Hutlinger, W. D.	16
Isaac, R. L.	8
Jackson, M. L.	53
Jacob, W. C.	50
Jacobson, H. G. M.	30
James, W. S.	44
Jamison, V. C.	30
Janzen, P. J.	8
Jeffries, C. D.	66
Jones, L. W.	41
Jones, U. S.	53
Jordan, J. V.	13
Kapp, L. C.	54, 60
Keller, W.	41
Kelly, W. H.	58
Kephart, L. W.	15
King, B.	19
Kinkor, C. P.	17
Kirby, O.	28

	Page
Kirkham, D.	24, 51, 52
Klingebiel, A. A.	5, 52
Klute, A.	50
Knapp, B.	47
Kohnke, H.	35, 66
Krusekopf, H. H.	63
LaFond, A.	64
Lang, R. L.	42
Lassen, L.	10
Lavin, F.	46
Laws, W. D.	50
Leaner, R. W.	43
Leithead, H. L.	11
Leyendecker, C. E.	55
Lillard, J. H.	10, 35
Livingston, R. B.	65
Lloyd, W. J.	23
Longley, A. J.	5
Loustalot, A. J.	25
Luetkemeier, O. W.	66
Lull, H. W.	9
Luthin, J. N.	27, 40
Lyman, R. J.	28
Lynd, J. A.	36
Lynd, J. Q.	60
MacKenzie, A. J.	59
McCabe, P. J.	19
McCalla, T. M.	57
McComb, A. L.	29
McCulley, R. D.	37
McCully, W. G.	13
McGurk, J. L.	34
McHenry, J. R.	35
McIntyre, A. C.	7
McKibben, G. E.	15
McLean, E. O.	53
McNall, P. E.	1
McPherson, W. W.	33
Madsen, L. L.	22
Marciano, J. J.	18
Marshall, C. E.	53, 63
Martin, J. P.	30, 56
Martinson, D. C.	51
Mather, J. R.	26
Maxwell, N. P.	35
Mayer, I. D.	35
Mazurak, A. P.	50
Means, U. M.	56
Mehlick, A.	53
Meik, E. E.	32
Menzies, J. D.	14
Meteer, J. W.	40
Midgley, A. R.	8
Miller, E. V.	61
Moody, J. E.	35
Moschler, W. W.	54
Moss, W. A.	9
Muller, F. B.	49
Munns, E. N.	10, 24
Myers, B. A.	42

	Page
Naftel, J. A.	17
Neal, O. R.	10
Neller, J. R.	58
Nelson, C. E.	14, 43
Nelson, M. W.	8
Nelson, W. L.	59
Netboy, A.	24
Newman, A. S.	55
Nichols, M. L.	1
Norton, L. J.	34
Nutt, G. B.	35
Obenshain, S. S.	54
Odell, R. T.	23, 26
Odland, T. E.	49, 59
Olmstead, L. B.	51
Olson, R. V.	63
Orr, H. K.	9
Paden, W. R.	60
Page, N. R.	60
Parshall, R. L.	20
Pease, H. W.	4
Pechanec, J. F.	44, 46
Peele, T. C.	65
Peevy, F. A.	11
Pennington, R. P.	53
Perkins, A. T.	53
Petersen, R. O.	48
Peterson, M. L.	4
Peterson, S. F.	62
Phinney, T. D.	2
Pinck, L. A.	21
Pitner, J. B.	61
Plice, M. J.	61
Polivka, J. B.	40
Potts, R. C.	54, 60
Potts, S. F.	32
Powell, R. W.	39
Pratt, A. D.	2, 19
Pronin, D. T.	65
Rampton, H. H.	9
Raney, W. A.	52
Read, R. A.	37
Reed, I. F.	30
Reid, R. R.	55
Reitemeier, R. F.	53
Reuszer, H. W.	56
Reynolds, E. B.	36
Reynolds, H. G.	46, 47
Rhoades, H. F.	35
Richards, L. A.	51
Richer, A. C.	25, 59
Roach, M. E.	32
Robertson, D. W.	16
Robertson, L. S.	39
Roessel, B. W. P.	25
Rogers, J. S.	7
Rohwer, C.	33
Roma G, C.	61
Rosen, W., Jr.	38
Ross, O. B.	13

	Page
Ross, P. E.	35
Rowe, P. B.	23
Rummell, R. S.	1
Russell, M. B.	52
Sartz, R. S.	16
Sauer, E. L.	25, 29, 34, 49
Saveson, I. L.	6
Schaller, F. W.	12
Schleusener, P. E.	17
Scholts, F.	11
Scholz, H. F.	64
Scott, V. H.	22
Scott, W. O.	15
Seay, W. A.	60
Shaw, W. C.	34
Shelton, F. A.	8
Sherman, M. S.	21
Shutak, V. G.	49
Sievers, A. F.	7
Silker, T. H.	31
Simmons, J. A.	49
Simon, R. H.	54
Simonson, R. W.	63
Slife, F. W.	15
Smith, D. D.	4, 14
Smith, D. H.	57
Smith, F. B.	57
Smith, J. C.	31, 36, 54, 60
Smith, J. G.	46
Springfield, H. W.	46
Stallings, J. H.	34, 44, 61
Stark, R. H.	9
Starkey, R. L.	34
Stauffer, R. S.	15
Steele, J. G.	66
Stelly, M.	57
Stevenson, E. W.	45
Stewart, G.	45
Stoddart, L. A.	22, 41
Stoltenberg, N. L.	24
Stone, E. L.	65
Storie, R. E.	17, 21, 64
Stout, O. E.	12
Sulaiman, P. K. De and M.	37
Sutton, J. G.	29
Swaby, R. J.	28
Swanback, T. R.	22
Swanson, C. L. W.	19, 20, 30, 43
Tarrant, R. F.	2
Taylor, C. C.	38
Taylor, G. S.	51
Taylor, S. A.	52
Temple, L.	62
Tesar, M. B.	16
Thatcher, L. E.	2, 9
Thomas, J. R.	55
Thompson, L. M.	54
Thorne, D. W.	20, 41
Thorne, J. P.	41
Thorne, M. D.	51
Thorton, G. D.	57
Toevs, J. L.	8
Trach, J.	62
Tribble, R. T.	1
Trogdon, W. O.	58
Trousdell, K. B.	17
Truog, E.	49, 60
Turk, L. M.	36, 60
Turrell, F. M.	34
Uhland, R. E.	65
Ulrich, R.	63
van Bavel, C. H. M.	8, 50
Van DerMarel, H. W.	37
Van Doren, C. A.	5, 28, 52, 66
Veatch, C.	3
Viets, F. G.	43
Villa, J. R.	61
Voigt, G. K.	62
Volk, G. W.	58
Wagner, J. A.	17
Walker, J. P.	10
Walker, L. C.	37
Wallace, A.	18, 43
Waugh, R. K.	33
Weaver, H. A.	2, 30
Weaver, J. E.	11
Weir, W. W.	17
Welch, C. D.	59
White, R. T.	19
Whitney, R. S.	16
Whitt, D. M.	14
Whittig, L. D.	53
Wilde, S. A.	62, 65
Willard, C. J.	2, 19
Williams, A. M.	12
Williamson, D. O.	22
Wilson, J. D.	18
Wilson, M.	18
Wilson, T. V.	24
Wischmeier, W. H.	14
Wittwer, S. H.	6
Wojta, A. J.	13
Wolfe, H. H.	22
Wolfe, L. G.	22
Wood, I. D.	32
Woodhouse, W. W., Jr.	33, 34
Woodruff, C. M.	58
Woolfolk, E. J.	44, 47
Wooton, W. M.	39
Young, D. W.	13
Young, V. A.	13
Youngberg, C. T.	64
Zack, L. W.	31
Zingg, A. W.	7, 22
Zook, L. L.	35